NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES VOLUME 3, NUMBER 33 OCTOBER 20, 1986

▶ FCC SCENE

Fowler touts total telco deregulation

BY KARYL SCOTT
Washington, D.C. Correspondent

Invoking the time-honored American ideals of competition and innovation, Federal Communications Commission Chairman Mark Fowler proposed last week a three-year trial deregulation of local telephone service.

The chairman posed his view in a *Federal Communications Law Journal* article that he coauthored with FCC Common Carrier Bureau Chief Albert Halprin and Common Carrier Special Counsel for Domestic Policy James Schlichting.

Speaking at an FCC briefing, Fowler said the trial period, which would begin in the 1990s, would be open to any state that wants to participate. He said 10 states have expressed interest in the concept, although he declined to name them. Fifteen states have already initiat-

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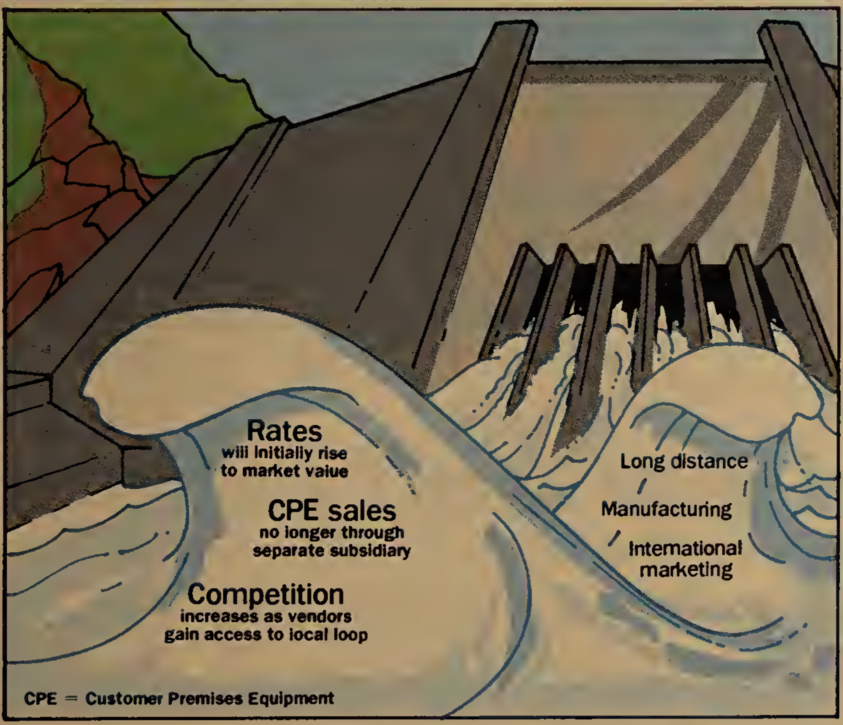
FCC Chairman Mark Fowler's proposal to open the floodgates


Rates
will initially rise to market value
CPE sales
no longer through separate subsidiary
Competition
increases as vendors gain access to local loop
Long distance
Manufacturing
International marketing

CPE = Customer Premises Equipment

▶ DEREGULATION

Users balk at Fowler proposal

Soaring local rates and cross-subsidization feared.

BY MARGIE SEMILOF
Senior Writer

Federal Communications Commission Chairman Mark Fowler's experimental plan for total deregulation of a few local telephone companies drew mixed reviews from communications managers last week.

Although some important details were not outlined, such as which states and which phone companies would be involved, communications managers expressed concern that a deregulated environment would remove rate caps for residential and business services and would cause telecommunications costs to skyrocket.

Managers contacted also said that if local companies start branching out into other businesses without regulatory checks, these companies would raise local rates to subsidize the ventures. Fowler's plan would allow phone companies to enter new businesses without seeking regulatory approval.

"They should investigate this before they decide to deregulate the local environment," said Don Gaffney, telecommunications manager at New York-based William Street Computer & Informa-

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NETWORK LINE

News

The GSA issued a $500m RFP for a digital integrated voice/data net serving Washington, D.C. federal agencies. Page 2.

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Ohio and South Carolina stand out from the rest of the state pack with their strong, economical and state-of-the-art networking schemes. Page 4.

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Mitel unveils a software package that will add an Integrated Message Center feature with unanswered call transfer capability to its digital SX-2000 ICS private branch exchange. Page 5.

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Reduced fuel use is the key to the Comsat Maneuver, a technique devised by Comsat for keeping its satellites up longer and costing less. Page 6.

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Novell announces development of a message-handling service that should ease message routing between its Netware operating system and other environments, such as those of IBM and DEC. Page 43.

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Features

Baseband network technology is riding a crest up and over broadband products. With IBM's Token-Ring Network handy, users just might want to catch the wave. Page 35.

▼

NEWSPAPER

FEATURE FOCUS

Big Blue keeps a close eye on open architecture

BY CLARE P. FLEIG
Special to Network World

Amid the noise of September's network management product releases, Ellen Hancock, vice-president of telecommunications systems for IBM's Communication Products Division, made a quiet yet determined statement about the way IBM views computer communications.

IBM, she stressed, was introducing a new term: "open communications architectures." This, she said, would "show our customers that many of IBM's communications architectures are open and that IBM has an established record

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▶ PRICE SHOPPING

DDS rates climb after fall

Users favor analog lines over costly digital links.

BY NADINE WANDZILAK
Staff Writer

After taking a nosedive when new tariffs were ratified last year, end-to-end rates for AT&T's Dataphone Digital Service (DDS) are creeping back up due to rate hikes affecting local access channels.

Although DDS became more attractive when AT&T slashed its rates with the enactment of Tariffs 9 and 11 in April 1985, the service is still typically more expensive than voice-grade, analog private lines. Cost continues to persuade most users to use DDS selectively, even though the digital service is ideal for data transmission because of guaranteed low bit-error rates and high availability.

The current rate increases are largely at-

See **DDS** page 43

▶ INDUSTRIAL AUTOMATION

9370s to get MAP link

IBM coming up in the factory world.

BY BOB WALLACE
Senior Writer

NEW YORK — In a factory networking statement of direction, IBM last week revealed plans to develop an interface product that will hook its recently announced 9370 processors to broadband networks compatible with the Manufacturing Automation Protocol.

IBM claimed its 9370 processors and recently unveiled 7552 industrial computer will fill the large and until now unaddressed communications gap between its mainframes and plant floor robots, workstations and programmable logic controllers.

MAP comprises a series of evolving and established standards designed to allow factory gear produced by different vendors to communicate over a single communications network. Although fully MAP-compatible nets are being installed only in large users' factories, most network equipment vendors view MAP as the factory networking wave of the future.

IBM claimed the four-processor 9370 family, which supports Ethernet and Token-Ring Network interfaces, was originally designed to serve users' departmental processing needs. In the factory, the systems will be used to supervise the operation of multiple IBM 7552s, devices used to control groups of plant floor devices in a manufacturing cell. IBM said 9370s may also serve as controllers for cells with more than a dozen shop floor devices.

> *“Work to develop a MAP interface for the 9370 has already begun.”*

John Klein, general manager of manufacturing systems products for IBM's fledgling Industry Systems Products business unit, said IBM surveyed users' factories to determine what plant floor products were needed. “We found there were a lot of individual activities taking place on the plant floor and, quite frankly, IBM did not have a very strong representation there.

“We had a very strong presence at the high end, but we identified a major void relative to our strategy of tying together plant floor devices so data could be passed up to our mainframes,” Klein said.

Paul Mugge, 9370 information system product manager, said work to develop a MAP interface for the 9370 had already begun. He said the interface would be an adaptor card that will establish a direct connection between a 9370 and a broadband, coaxial cable-based MAP net, not an external control device. “The need for this interface is urgent if the 9370 is to be used in manufacturing environments,” Mugge claimed. The interface will likely be included in IBM's next se-

See **MAP** page 6

▶ WITS CONTRACT

Vendors eye $500m D.C. net

RFP for all-digital FTS adjunct issued.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The General Services Administration (GSA) last week issued a request for proposal (RFP) for an all-digital voice/data network to serve federal agencies in the Washington, D.C. metropolitan area.

Designated the Washington Interagency Telecommunications System (Wits), the network will service 100,000 telephones in 54 locations. The 10-year, $500 million contract calls for the engineering, design, installation, service and support of the new network.

The GSA will hold a public meeting on Nov. 19 to detail and explain the parameters of the Wits contract. The RFP, for example, requires the network vendor to provide a migration to an Integrated Services Digital Network. It will also allow the bidder to use steam tunnels that go under and through federal government buildings and enable the vendor to bypass Washington, D.C.'s local telephone company.

When complete, the Wits network will connect Washington, D.C.-based government agencies with Federal Telecommunications System 2000 (FTS 2000), the federal government's long-distance network. The GSA is currently overseeing the $4.5 billion replacement of FTS 1000 with FTS 2000.

Several vendors planning to bid on FTS 2000 said they will consider making a Wits bid. AT&T, Martin Marietta Corp., Boeing Computer Services Co., Northern Telecom, Inc., Bell Atlantic Corp. and BellSouth Corp. are but a few of the firms expected to participate in the Wits competition. AT&T and Bell Atlantic are the only firms that have confirmed their intentions.

Bell Atlantic's C&P Telephone Co. of the District of Columbia currently provides the mainstay of Centrex telephone service to feder-

See **Wits** page 5

▶ TOLL-FREE SERVICE

AT&T files low-end 800 tariff petition

BY JIM BROWN
New Products Editor

WASHINGTON, D.C. — AT&T filed a tariff petition with the Federal Communications Commission last week for an interstate 800 service that can be accessed with the same lines used to support basic customer calling. If approved, 800 Readyline could be available by Nov. 28.

Unlike AT&T's current 800 services, which require special access lines dedicated to receiving 800 service calls, 800 Readyline enables customers to field 800 calls with basic local and long-distance service lines.

The service, AT&T said, is aimed at small businesses that find it too expensive to add 800 service, and at existing 800 customers who receive less than 10 hours of 800 calls per month. AT&T proposes to charge a $20 monthly fee plus normal long-distance usage charges for 800 Readyline service. Usage charges above $100 a month will be discounted by 10%, AT&T said.

“This sounds like it is aimed at the fairly small customer,” said Jerry Harder, senior consultant with Telco Research Corp. of Nashville. But the reduction in line access charges, he added, could poise 800 Readyline to replace traditional 800 service within the next few years.

“The reason AT&T is doing this is not so much to make 800 service affordable to the everyday person, but to make it affordable to its current customer base,” Harder said.

The proposal comes on the heels of a tariff filing last month seeking to establish a Custom Switched Network Service (CSNS) that

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A contract between AT&T and Ungermann-Bass ensures Net/One will operate on AT&T's PDS wiring system. **Page 8.**

INDUSTRY UPDATE

An interview with DCA's president and CEO provides some answers to questions about his firm's merger and acquisition plans. **Page 9.**

TELECOM TRENDS

GM subsidiary EDS is building a national network for Chevrolet dealers. **Page 15.**

FACTORY COMMUNICATIONS

IBM unveiled an industrial microcomputer that can be linked to shop floor devices, the Token-Ring and 9370s. **Page 21.**

DATA DELIVERY

Several large vendors used Dexpo West to introduce products supporting TCP/IP. **Page 17.**

COMMUNICATIONS MANAGER

At a recent NUA powwow, net management, security and control were the issues. **Page 23.**

NEW PRODUCTS AND SERVICES

Banyan Systems, Inc. unveiled enhancements to its Vines operating system. **Page 27.**

FEATURES

The strength of IBM's Token-Ring increases the need for managers to know the basics. **Page 35.**

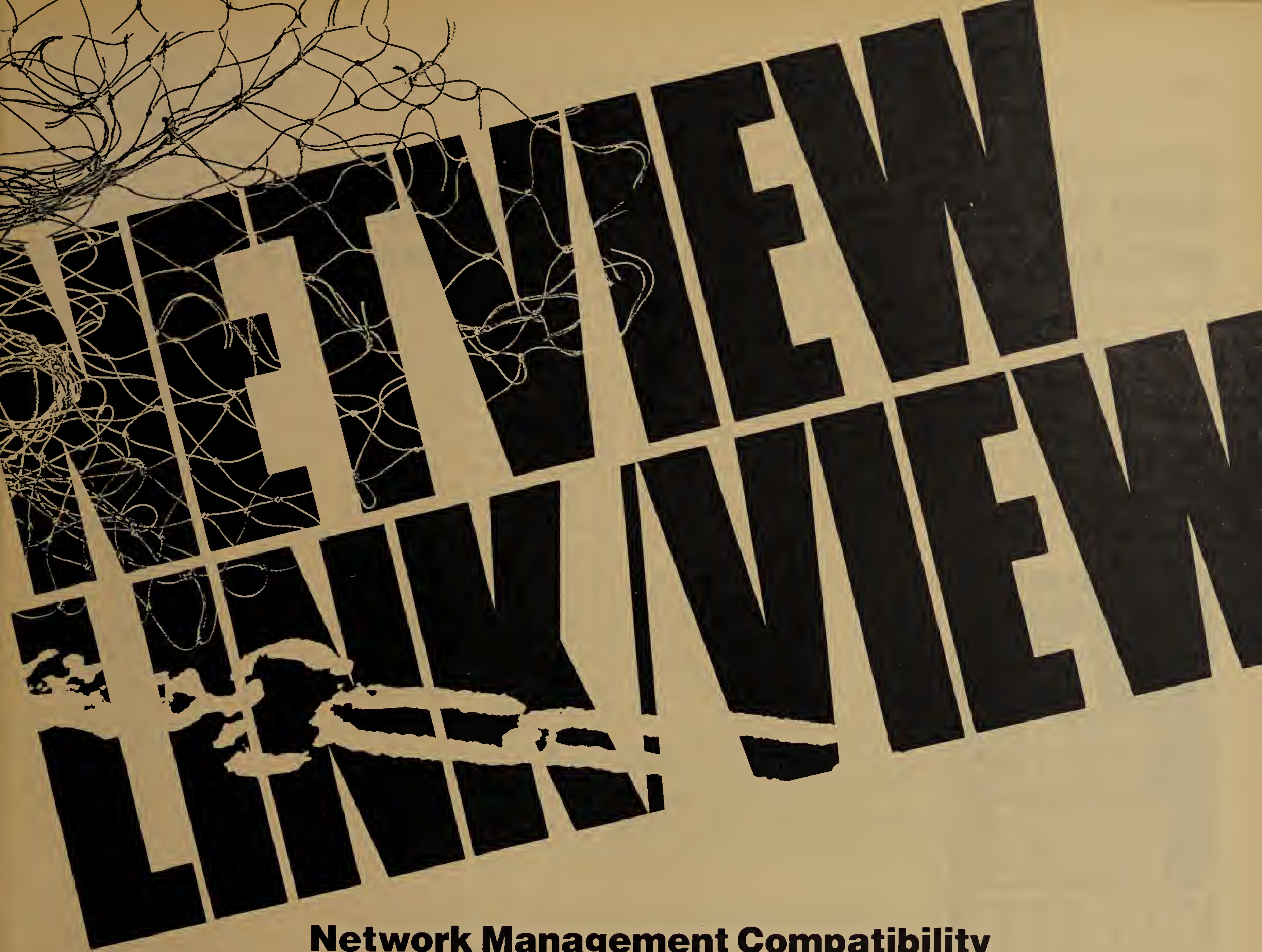
▶ AT&T/IBM

Layoffs, appointment

AT&T is expected to announce layoffs this week that will affect district managers, directors and some vice-presidents. The reshuffle is a result of merging communications and equipment divisions.

“Normally, they shoot the peasants, but this time they're inside the palace,” an insider reported.

In a related move, but on a happier note, IBM last week named senior vice-president Allen J. Krowe as corporate executive for worldwide development and U.S. manufacturing for the Information Systems and Communications Group, the Information Systems and Products Group and Rolm Corp.



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A Timeplex-developed software package, LINK/VIEW runs on the IBM NetView/PC network control processor system.

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▶ GOVERNMENT COMMUNICATIONS

Ohio slashes $5m from state budget with beefed-up microwave network

Eight-hub T-1 system managed, controlled from central site.

First of a two-part series.

BY MICHAEL FAHEY
Staff Writer

State governments are often characterized as conservative, play-it-safe organizations. But at least two states, Ohio and South Carolina, are instituting strategically and technologically up-to-date communications operations that will save taxpayers money while delivering improved services.

Although Ohio and South Carolina's plans differ in some respects, both states share a common approach to communications management. They have strong, centralized agencies overseeing their communications systems.

In 1983, after his agency had undertaken a three-year study of Ohio's communications needs, William Sykes, director of the Ohio Department of Administrative Services, submitted a request to the legislature proposing that the state institute a microwave backbone network to provide communications for all the state agencies and the Ohio university system.

The idea was to beef up an existing network to accommodate new traffic.

The state contracted with ITT Federal Electric Corp., the company that built and maintained a microwave network for the Ohio Educational Broadcasting Network, to add four additional microwave towers to its existing 20.

> *"Although Ohio and South Carolina's tax-saving strategies differ in some respects, both states share a common approach to management, with centralized agencies overseeing their systems."*

The state then tied in the State Highway Department's microwave system to complete the backbone network. The new system now meets virtually all of the state government's voice needs and serves 4,500 data terminals.

"The backbone has a figure-eight configuration," said Tim Steiner, communications manager in the Department of Administrative Services. "The capital, Columbus, where the network control center is located, is in the middle of the figure eight."

The network has eight hubs located throughout the state. T-1 lines connect the hubs to local telephone company central offices throughout the state.

Ohio is served by 32 local telephone companies, Steiner said. He added, however, that the five largest telephone companies — Ohio Bell Telephone Co., Cincinatti Bell, Alltel, General Telephone and United Telephone — coordinate service between the state and the smaller companies.

"We have a staff of 50 who work for the state, including about 20 telephone operators," said Steiner. "We have 25 people working in the network control center in Columbus. They are mostly data communications types who learned telephony. We are the only organization other than a phone company that owns AT&T remote testing system equipment." That equipment, the Switched Maintenance Access System/Switched Access and Remote Test System (Smas/Sarts), purchased from AT&T Technologies, Inc., allows the state to test its T-1 lines by tying into the local telephone companies' lines.

The Ohio network, which was cut over in August, allows the state to bypass AT&T for inter-local-access-and-transport-area, long-distance calls.

When the network was first proposed in 1980, the state was facing rising long-distance telephone rates. Implementing the new network was expected to reap a saving of more than $218 million during the expected 15-year life of the new system.

Now, however, Steiner said that falling long-distance rates have led the state to revise the estimated saving from about 53% to a figure between 30% and 35%. He noted that a conservative estimate of the expected saving from the new network would be about $5 million per year during the expected 15-year operation of the system.

Steiner claimed that the new network has provided additional benefits in addition to the saving.

"The state lottery agency has been able to add 30% more telephone circuits than it originally planned," Steiner said, adding, "there are other benefits that we can't put a dollar figure on.

"It used to take 10 weeks to put in a circuit from a common carrier. Now we can do that in less than a month. If an office that handles workman's compensation moves, it can get phone service much faster. That's a definite benefit for our citizens." ☑

Next week: South Carolina consolidates its communications.

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▶ PBXs

Mitel to add message software to SX-2000

BY JIM BROWN
New Products Editor

BOCA RATON, Fla. — Mitel Corp. is expected to introduce today a message center software add-on package for the SX-2000 Integrated Communications System, its digital private branch exchange.

The package, called MS2003, adds support for an integrated message center feature, a digital trunk interface capable of supporting two T-1 links and a feature package for the lodging industry.

The floppy disk-based software upgrade can be loaded into existing switches, said Art Franks, assistant vice-president of marketing.

Mitel, with an installed base of about 500 of the 4,000-port, nonblocking voice/data PBXs, expects to make the product available through its distributors in November. The MS2003 package also includes software support for a digital T-1 trunk interface card that takes advantage of the switch's internal pulse code modulation scheme and time division multiplexing for digital transmission. The dual-port card supports connection of two T-1 links, providing the equivalent of 48 voice channels.

The software supports the D4 framing standard of domestic T-1 services or the CCITT European format, which yields 32 channels over a 2.049M bit/sec link. The package also allows system administrators to define each channel as either a data or a voice channel and to instruct the switch to handle it appropriately.

The firm says that next year it will introduce Mitel Superswitch Digital Network software. This will offer advanced private networking to support messaging across the network, network diagnostics and feature transparency across the network.

While the other features of the package are seen as an attempt by Mitel to catch up to the capabilities offered by PBX vendors, the T-1 capabilities may give Mitel a slight edge in its effort to integrate voice and data in the office automation arena. "Mitel managed to add T-1 more elegantly than others," said Greg Carlsted, manager of voice and image for the telecommunications industry service of Dataquest, Inc., a San Jose, Calif.-based research outfit.

The Integrated Message Center uses Mitel's Superset 7 attendant station, which has an attached data display terminal. The terminal is driven by switch resident software and can also be used as an operator console and system administration workstation.

The message center operator receives calls from extensions that have gone unanswered after a user-defined number of rings. The name of the person being called appears on screen if the call recipient is listed in the switch's corporate directory data base.

The call time and date are also automatically displayed along with a menu of frequently used messages such as "please call," one or more of which can be added to the message being taken. The operator also has the option of typing in a more detailed message along with the phone number and name of the person who called, Franks said.

The Ascii file created by the operator is stored in the recipient's message slot within the switch's 8M bytes of random-access memory and is also backed up onto a 20M-byte hard disk. Message slots can be configured to purge the message automatically once it's been read. Access to message slots can also be protected with password security.

The lodging package to be unveiled this week allows the system administrator to assign blocks of extensions to support guest functions and another block to support administration functions.

Pricing for the software package is expected to range from $5,000 to $40,000, depending upon the PBX configuration and the options chosen.

Wits from **page 2**

al agencies in Washington, D.C. Other vendors also provide agencies with alternative services.

The Wits concept was created in 1981 as a result of a GSA study. In 1982, the GSA gave federal agencies permission to upgrade their internal telephone systems. These systems must be able to interface with the FTS.

There are other regional systems like Wits in metropolitan areas with a greater number of federal offices, such as those in the Midwest and New England. Other regional telephone systems are planned for New York and the Southwestern region.

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▶ NATIONAL NETWORK

IBM wins Social Security Administration contract

Pact is part of overall net upgrade plan.

BY MICHAEL FAHEY
Staff Writer

BALTIMORE — The Social Security Administration (SSA), headquartered here, recently awarded IBM's Houston-based Federal Systems Division a $68.4 million, 7-year contract to supply terminals, controllers and printers that will assist Social Security employees in processing client questions and benefits claims.

The contract, which was awarded through a bidding process, is a portion of the SSA's overall 3-year plan to upgrade its national network.

Units include 3274, 3379 and 3268

IBM will supply the SSA with a total of approximately 33,000 IBM 3274 Control Units, IBM 3179 color display stations and IBM 3268 printers.

An IBM Systems Network Architecture-based network, called a data communications utility, will be used in linking 1,300 field offices to SSA headquarters.

The IBM Houston facility will also supply training, maintenance and technical support for developing system procedures at the SSA's Baltimore offices.

Terminal installation at all 1,300 field locations is expected by the end of 1988.

The remainder of the seven-year contract includes maintenance and service.

The upgraded network will connect the SSA national computer center here to six regional offices located throughout the country, using transmission facilities supplied by American Satellite Co., according to an SSA spokesman.

American Satellite will connect two regional offices in New York and Philadelphia using land-based, fiber-optic cable.

Regions linked by fiber optics

Regional offices in Birmingham, Ala., Kansas City, Mo., Chicago and San Francisco will be connected to the computer center via satellite.

Field offices will be connected to the regional office via leased lines, which will be awarded to carriers with the most competitve tariff structures, the SSA spokesman said.

The current SSA network has some 4,200 terminals made by Paradyne Corp.

The upgraded network will have 22,500 terminals and employ a standard protocol, SNA/Synchronous Data Link Control, according to the SSA spokesman.

The current system is a batch-oriented system, allowing most client information to be processed overnight.

There are currently only about two terminals at each SSA location, according to the agency spokesman.

The new system and increased number of terminals will allow online changes in SSA client information.

The system will employ IBM's Customer Information Control System software.

The new system will save a considerable amount of time and paperwork in the handling of the SSA's major programs, the agency spokesman said.

Those programs include retirement benefits, survivors and disability insurance, supplemental security income and Aid to Families with Dependent Children. ☑

MAP from **page 2**

ries of industrial product announcements, he forecasted.

IBM's recently announced 7552 industrial computer (see related story, page 21) uses IBM's A Real-Time Interface Co-Processor to communicate with programmable controllers produced by such vendors as Allen-Bradley Co., Texas Instruments, Inc., General Electric Co. and Gould, Inc. The processor can also be fitted with a card, co-produced by IBM and Industrial Networking, Inc., which will serve as a MAP net interface.

The 9370, once connected to the MAP net, would be used to pass data from an IBM mainframe in the factory's computer room to the 7552, which would relay the data to the shop floor devices. The 9370 could also be used to relay data from multiple 7552s to the same IBM mainframe.

Rudolfo Salas, IBM's Manufacturing Industries Information Systems Group director, said relational data base technology and data communications services will figure prominently in users' efforts to assure universal access to a centralized repository of manufacturing data.

Salas added that IBM is focusing its efforts on developing software that would facilitate communications between different applications as well as the access of plant data from remote locations.

The installation of MAP-compatible nets on the factory floor is seen as only one aspect of creating a Computer-Integrated Manufacturing (CIM) system. The CIM concept calls for the integration of design, scheduling and manufacturing systems within a corporation. ☑

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BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The Communications Satellite Corp. announced last week that it will adopt a technology to extend the life of its existing satellites and enable the company to lower the cost of its services.

The new technique, called the Comsat Maneuver, will allow Comsat's satellites to drift in their orbits more than they do today, conserving the fuel they carry to maintain orbit.

Relaxing stringent orbit maintenance requirements will reduce satellite fuel consumption from 37 lbs. per year to 3 lbs. per year and will extend the seven-year average expected life of the birds between 50% and 100%, the company claimed.

The money Comsat will save should be passed on to users through lower service rates, a spokesman said.

There is, however, a catch.

Users will have to upgrade their earth stations at an estimated cost of $15,000 each to enable the equipment to track the satellites.

Comsat said fuel consumption is one of the major factors limiting the life span of satellites.

In their orbits 23,000 miles above the equator, satellites tend to drift.

Ninety percent of a satellite's fuel is used to counter that movement and maintain a steady position for constant communications with earth stations.

The drift introduced with the Comsat Maneuver requires that the angle of the satellite's antenna be changed slightly so that it is always pointed at the same geographic region on the earth.

In addition, the Maneuver requires that the ground antenna be altered so that it can move to track the shifting satellite and maintain constant communication.

Most antennas today are stationary and do not have tracking capabilities.

Satellites drift primarily north and south, meaning that their ability to serve a geographical area, or footprint, on earth drifts in the same direction.

The changes required of ground equipment would enable the earth stations to follow the satellites in this movement.

"As a result of Comsat's control technique, issues such as launch availability and insurance, satellite design and competition from fiber optics must now be reexamined," said William Mayo, president of Comsat General Corp., at a press conference last week.

"This technique is a response to heavy competition and cost pressures in the communications industry and will make satellites even more cost competitive with fiber-optic cables.

"It will reduce Comsat's costs and unquestionably make us the low-cost provider of satellite services," Mayo said.

Comsat plans to use this technology in its Comstar satellites now in orbit.

It has filed a patent application for what it considers to be a proprietary technique.

The company hopes to market this technology to other satellite vendors, Mayo said. ☑

▶ SURVIVAL STRATEGY

Corvus tries to regroup

Omninet receives new wiring scheme.

BY MARY PETROSKY
West Coast Correspondent

SAN JOSE, Calif. — Corvus Systems, Inc. reported a first quarter loss of $3.8 million for fiscal year 1987 at a press briefing here last week. The gathering doubled as a platform for explanation of the company's survival strategy and introduction of a wiring product.

Although revenue was up 4% from the same period in 1986 and up 8% from the previous quarter, the company said it lost $3,871,000 on revenue of $12,423,000 for the quarter ending Aug. 31.

"We are clearly in a turnaround situation," said Joseph Rooney, executive vice-president.

"Cost reduction is a way of life at Corvus. We've had significant layoffs to bring expenses in line with revenue." Management has cut the company in half this year — from 600 employees in January to 300 today.

Instrumental to Corvus' survival strategy is a renewed focus on local-area networking, Rooney said. As a result, the company has been divesting itself of a number of ventures and product lines and is now "taking steps to withdraw from the disk drive business," he said.

Rooney said he expects sales for the second fiscal quarter to be ahead of sales for the same period last year, but as for profitability, "it's a fine line we walk," he said.

The new wiring scheme, the Omninet Cabling System II (OCS II), was designed to reduce the complexity of local-area net installation and to bring the per-node connection cost to less than $300, according to Brian MacLeod, product marketing director. OCS II uses existing twisted-pair wiring to create a logical bus on a physical star topology.

Omninet is a 1M bit/sec network using a carrier-sense multiple access with collision-avoidance transmission access method. It supports end-to-end distances as great as 4,000 feet.

Omninet has always used twisted-pair wiring; however, the network previously couldn't use existing telephone wiring. This older wiring scheme was based on a physical bus topology.

OCS II has been designed to support data transfer rates from 5K bit/sec to 4M bit/sec to provide a migration path to higher speed networks. MacLeod said Corvus will have a series of announcements in the coming months. The company had previously announced that it was working to develop a chip set to allow Omninet to operate at 4M bit/sec. A product based on that chip set has not yet been announced.

The Omninet Hub is at the heart of the new cabling system. The hub, which was developed jointly with Cornell University's Computer Services Group, consists of a Star Controller that supports up to 25 wire pairs.

> *"'Cost reduction is a way of life at Corvus. We've had significant layoffs,' said Joseph Rooney, executive vice-president."*

The hub is installed in a user's telephone wiring closet to take advantage of spare telephone wire pairs. These wires are connected to the Star Controller via a Corvus device that uses a standard 25-pair connector and RJ21 distribution blocks.

Two additional controllers can be added to each hub, allowing up to 64 nodes, each at a distance of up to 1,000 feet, to be connected via each hub. In addition, up to 25 hubs can be interconnected to create a two-tier network.

Network nodes are connected to the hub using a combination of snap-together components. For single-station connections directly to the hub, Corvus is offering the OCS II Splitter, a Y connector with standard telephone connections for a telephone and personal computer.

All OCS II components function with current Omninet interface cards and network servers. The newer and older cabling schemes can be connected via an Active Junction Box II. ☑

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▶ UNGERMANN-BASS

AT&T's PDS set for test

BY MICHAEL FAHEY
Staff Writer

SANTA CLARA, Calif. — AT&T and Ungermann-Bass, Inc. last week announced an agreement designed to ensure that Ungermann-Bass' Net/One token-ring local-area network will operate on AT&T's Premises Distribution System (PDS) wiring system.

The agreement, which calls for AT&T to provide Ungermann-Bass with test equipment, will enable Ungermann-Bass to certify PDS as a suitable medium for its token-ring local network.

Once certified, problems that arise on an Ungermann-Bass network implemented on AT&T PDS wire will be the responsibility of Ungermann-Bass, according to spokeswoman Angela Mongillo.

Ungermann-Bass' Net/One token ring is a 4M bit/sec network that meets the IEEE 802.5 specification for token-bus networks.

The AT&T PDS wiring plan stipulates use of nonshielded twisted-pair wire and, for trunk applications, fiber-optic technology.

"This agreement will help Ungermann-Bass get large corporate accounts," said Eric Killoran, president of Andover, Mass.-based Hyatt Research Corp., and publisher of *PC Netline*. "AT&T is in a good position to wire large buildings and campuses for data."

In the past, according to Killoran, "Ungermann-Bass has been a coaxial cable-intensive company. The twisted-pair PDS will allow Ungermann-Bass to sell their products to customers using a media that is lower in cost."

AT&T will benefit from the agreement by gaining another independent local-area network maker whose products operate on PDS, Killoran said. ☑

Trial from **page 1**

ed telephone deregulation on their own, and another 11 are considering similar actions.

Fowler said the article's purpose was to inaugurate a national dialogue aimed at creating a new model for the telecommunications industry as it moves from regulated monopoly to competitive industry.

"Telecommunications policymakers should concentrate on developing an entirely new model for telecommunications, rather than tinkering on the edges of an antiquated public utility model that is inappropriate for the new information age," Fowler said. "The article seeks to refocus the current debate on the more fundamental issues by reaching back to the American ideal of a free enterprise economy."

Fowler advocates enacting state deregulation along the lines federal regulators proposed in the Third Computer Inquiry. Computer III eliminated the need for AT&T and the Bell operating companies to establish separate subsidiaries to offer enhanced services.

"It may be appropriate to remove restrictions on BOC manufacture of telecommunications equipment if it appears unlikely that the BOCs will engage in improper cross-subsidization and anticompetitive activities," the article said.

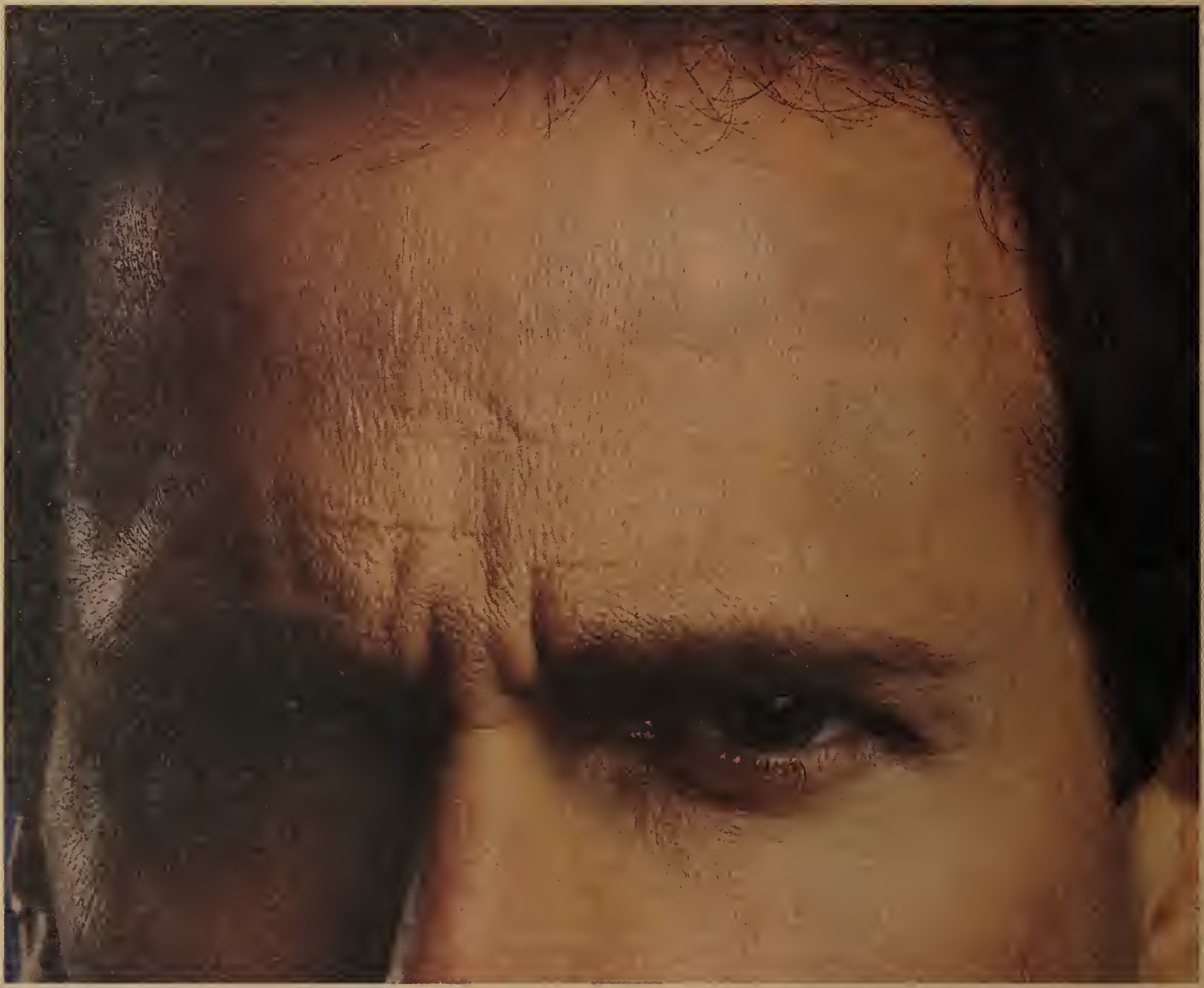
Regulations governing market entry and exit, rate of return requirements and structural separations would be eliminated under the trial. Halprin added that "The FCC would work with all the necessary authorities, including state commissions, and would help seek any necessary waivers from the [Modified Final Judgement] restriction."

The trial would be subject to the maintenance of universal service, implementation of an open network architecture in the public network and application of nonstructural safeguards such as minimal cost allocation measures and accounting safeguards to prevent cross-subsidization. The trial's desired effect would be the creation of a blueprint for other states to follow. The overall objective of the trial is not deregulation for the sake of deregulation, Halprin said at the briefing, but increased competition and innovation.

Many BOCs seem extremely supportive of the plan. US West, Inc. lauded Fowler's efforts. "We have advocated market freedom for a long time and will participate in any debate and trials that take place," said company spokeswoman Roberta Bashin.

Bell Atlantic supported the action as well and suggested close coordination between state and federal regulators to eliminate customer confusion and ensure that customers benefit from the action, according to spokeswoman Christine Valmassei.

One state regulator who found fault with the plan is Perry Swisher, chairman of the Idaho Public Utility Commission. "Deregulation does not automatically bring about competition, and competition does not automatically guarantee lower rates," he said. ☑



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INDUSTRY UPDATE

Comsat offers volume discounts

Communications Satellite Corp.'s Intelsat Satellite Services unit is offering volume discounts to customers after filing new tariffs with the Federal Communications Commission. The company cited as a reason recent changes in the competitive climate, including increased use of undersea cable. The proposed tariffs may result in as much as a 17% reduction in cost for customers committing to five- or seven-year contracts for voice-grade service and International Business Satellite Service.

Digital Communications Associates, Inc. performance record 1985 to 1986

	Fiscal year 1985	Fiscal year 1986
Sales	$99.1m	$137.8m
Net income	$10.8m	$20.68m

	Quarter ended Sept. 30 1985	Quarter ended Sept. 30 1986
Sales	$37.2m	$32.7m
Net income	$2.8m	$3.6m

Number of employees — 1,000

Note: Figures will be readjusted due to recent acquisitions.

SOURCE. DIGITAL COMMUNICATIONS ASSOC. INC., ALPHARETTA, GA.

INTERVIEW

DCA chief speaks on merger designs

CEO Nordin discusses marketing and DCA's aggressive acquisitions stance.

Digital Communications Associates, Inc. (DCA) has gained prominence in the data communications market through a series of well-chosen and ultimately successful acquisitions. Most recently, the company, which is based in Alpharetta, Ga., merged with Microstuf, Inc., a leader in sales of asynchronous personal computer communications software. Revenue and earnings figures, also recently reported, reflect continued growth. Bertil Nordin, president and chief executive officer, is the primary author and implementor of the company's aggressive acquisition strategy. The former executive vice-president and CEO of Contel Business Systems has been with DCA since 1981. Network World *Senior Editor Pam Powers recently interviewed him.*

How has DCA evolved to the company it

See **DCA** page 10

VENDOR VIEW

MARK DAVIES

OSI holds center stage in drive for end-to-end networking nirvana

There's a lot more to Open Systems Interconnect (OSI) than pure technology. At the last OSI standards meeting, held in London in September, 450 people representing more than 150 vendors and users turned out to work. And work they did. In the three and one-half weeks of the session, more than 500,000 pages of photocopying were generated by the six working groups. The output for OSI-related standards currently equals the combined output of the rest of the International Standards Organization (ISO).

Why is there such an interest in OSI? Primarily, it is an issue of dollars and cents. To achieve the full benefit of computers in the workplace, applications must be able to communicate efficiently and economically. The network itself must be invisible. The only way that this can happen is if the protocols for interfacing into the network are consistent.

In the standards arena, OSI has been revolutionary. It began in 1978 as a vision with a far-reaching goal: to develop a set of standards that would allow information to be transmitted anywhere in the world — regardless of equipment vendor.

The OSI standards would be based on looking at the network as an integrated system instead of individual devices. For the first time, the ISO would develop standards that would be applied to a future set of products, instead of those that were already in existence. It was a futuristic approach that looked beyond today and built in a flexibility to accommodate tomorrow's new technologies and applications readily. Given the lightning speed at which technology moves, this was the only approach that made sense.

Most importantly, it was an effort initially driven by a need for worldwide communications, not individual company interests.

The seven-layered OSI Reference Model took two years to come to fruition. Although dividing communications processes into logical services appears simple, it is this very simplicity that has made the model so effective.

By providing a framework that clearly defines communications functions into seven distinct and separate layers, it was possible to develop standards in parallel for each of the seven layers and to produce the volume of work completed on OSI to date.

The result? Sixty documents outlining OSI protocols are now at draft proposal stage, 60 documents of not less than 100 pages each. Perhaps one of the biggest undertakings ever tackled by a standards-making body is becoming a reality in six short years.

With the first OSI-compliant products coming to market, users will finally realize the benefits of this massive standardization effort. Users will be able to expect end-to-end networking. Intelligence will be located in the most practical places in the network, allowing the network to be self-healing. Network management systems will be capable of managing the entire network instead of just discrete devices. Most importantly, users will be able to build their own networks based on the technology and vendor equipment most suitable for their individual businesses.

The OSI effort has not been without its battles. Initially,

See **OSI** page 14

Davies is vice-president of wide-area network operations for Codex Corp. in Mansfield, Mass.

CONTRACTS

MERRIMACK, N.H. — **Digital Equipment Corp.** announced an agreement with **Cyborg Systems** to comarket systems for personnel and payroll departments.

Under the agreement, the companies will work together to promote the sale of Cyborg's Payroll Administration System and Human Resource Management System as an integrated data base system meeting the needs of both payroll and personnel.

$

SUNRISE, Fla. — **Racal-Milgo, Inc.** signed a contract with the **U.S. Social Security Administration** for a diagnostically controlled data communications network.

The contract, valued at more than $11 million, includes the use of Omninode modems and the Communications Management Series network management system. The new network will handle interactive social security claims processing and replace the existing net.

$

HAUPPAUGE, N.Y. — **AT&T** awarded **Coherent Communications Systems Corp.** a second multiyear contract for Model 04 integrated voice/data multiplexers.

$

NEW YORK — **Ericsson, Inc.** won a $1.6 million contract for a fully digital private branch exchange system to be installed at Mansfield University in North Central Pennsylvania. The network, using Ericsson MD110 PBXs, will provide simultaneous voice and data transmission to more than 1,300 students and employees.

DCA from **page 9**

is today, and what factors were instrumental in your decisions to acquire other companies?
When DCA was founded in 1972, it marketed only network communications products for switching asynchronous terminals. After I arrived, the company went public in February 1983. In August, we merged with Technical Analysis Corp., the makers of the Irma board.

Then in February 1986, we merged with Forte Communications Co. of San Jose, Calif. Forte makes a line of graphics and emulation products. In September, we merged with Cohesive [Network Corp.], which markets switching T-1 multiplexers, and just recently we merged with Microstuf.

First we looked at market areas we thought we should be in but did not have the time or the wherewithal to develop the products ourselves. So then we looked for companies that did. We also looked for companies that had a culture that fits — in fact, we think that is probably the most important element.

Having acquired or merged with another company, how do you incorporate them into DCA? Do they remain autonomous, or are functions merged?
That differs from company to company. With Technical Analysis, DCA took over the functions of manufacturing, accounting and certain parts of marketing. With Forte, the sales and marketing organizations were merged, but the general management, which included the Irma division and Forte, was given to the president of Forte. With Cohesive, manufacturing and engineering will remain separate; however, the sales, marketing and accounting departments are being merged. Microstuf will be entirely separate.

How have the sales forces been organized to sell a range of products, from add-on boards to sophisticated networking equipment?
DCA network products and Cohesive products are marketed by one organization, Forte and Irma products by another.

DCA networking products and Cohesive products are sold by a direct sales force with on-site customer service. Users are primarily large corporations, institutions such as banks and brokerage houses, universities and governmental agencies.

Forte and Irma products are sold through distributors. This personal computer communications group consists of box products, which are more effectively sold through distributors; by that I mean independent organizations working in geographic areas that serve either other distributors, retailers or systems houses. Some sell direct to the end user and retail chains like Computerland and Businessland.

It's a double distribution plan that we've found to be successful. I don't anticipate any change in this strategy.

What products generate the highest percentage of revenue at this time?
The biggest single source of our revenue at this point is the personal computer communications product line.

Bookings of Irma products in the month of August were the highest ever, and September was even higher than that.

Do you anticipate any problems in your other lines of business? The statistical multiplexer market, for instance, seems to be getting crowded.
We don't really consider ourselves a player in the stat mux market. We have a stat mux, probably one of the best, but we primarily sell them as part of a large network.

We have serious competition in the form of Codex [Corp.] and Infotron [Systems Corp.], but our networking equipment has more software content and is more flexible. Our basic selling points are modularity and reliability.

As competition heats up, how do you plan to market DCA products to woo customers faced with many choices?
We see service as more and more of a key issue. We think the three most important things in this business are service, service and service. For instance, we just put in a 24/24 warranty program in which someone contracts with us to install the equipment, and they hold the software maintenance agreement. We will guarantee the hardware against defects for 24 months and a 24-hour turnaround on repair work.

What new products do you see in DCA's future, and do you expect to acquire them through internal development or through merger activity?
We don't normally disclose unannounced products, but I can tell you that we spend more in percentage of revenue on research and development than any of our competitors — about 12% annually.

We've got a lot of new products under development that will complement our current product line. ◼

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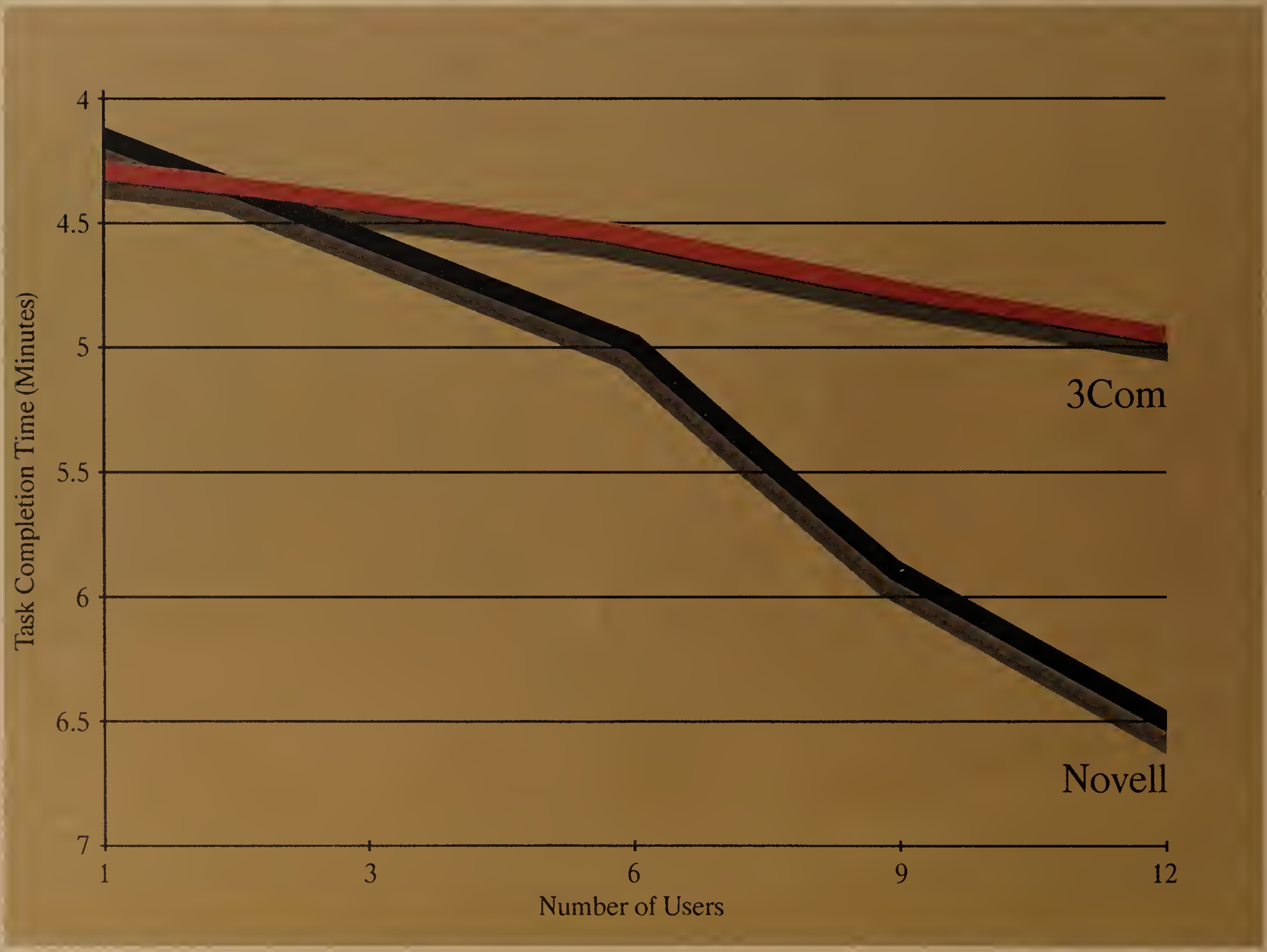

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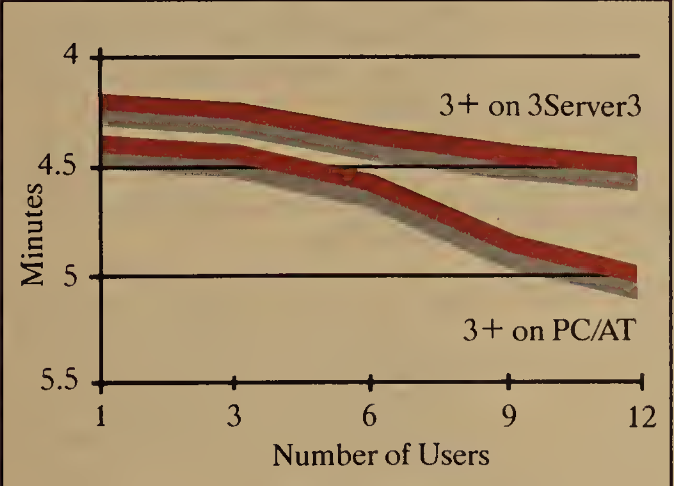

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OSI from **page 9**

those members that were device-oriented argued with vendors that saw a systems approach as the way of the future. Those that were used to the methodical approach of codifying standards for existing products were at direct odds with those that were willing to take the risk and ultimately reap the benefits of the OSI approach.

However, the times were clearly on the side of a systems approach. In 1978, the mainframe was being displaced by minicomputers and distributed processing. Personal computers soon exploded on the scene, along with the need to network and manage devices at customer premises as well as across broad geographic boundaries. Business has been quick to take advantage of the service and revenue opportunities presented by their communications networks. From a number of arenas, the push to develop integrated networking was on.

From the outset, vested interests charged to the surface. In 1978, a study was conducted by the French to determine how they could remain competitive worldwide in the high-technology market. Entitled the "Impact of Computerization on Society," the study outlined five areas of concentration: software portability, data bases, office automation, distributed data processing and satellite communications.

> *"For Europe, OSI became strategically important as a means of countering IBM and homogenizing the European market, providing larger markets for Europe's domestic computer industry."*

The French determined that this would not happen without a general framework for communications. They clearly needed OSI as a way to ensure a market share for European computer manufacturers and to confine the monopoly of the PTTs. Similar studies were conducted by Japan and the UK, each reaching the same conclusion.

For Europe, OSI became strategically important as a means of countering IBM and homogenizing the European market, providing larger markets for Europe's domestic computer industry.

In the U.S., major corporations, including Motorola, Inc., have stood behind OSI with the newly formed Corporation for Open Systems. General Motors, through its Manufacturing Automation Protocol (MAP), has endorsed OSI. Boeing Computer Services Co. has followed in the office environment with Technical and Office Protocol (TOP).

While users and independent manufacturers stand to gain the most from OSI, not everyone is a clear winner — in particular IBM. OSI embraces peer-to-peer communications, while IBM's Systems Network Architecture is based on the traditional hierarchical approach evolving from mainframe communications.

Ironically, IBM's very strength as a mainframe manufacturer is an inherent weakness as the world evolves to distributed processing.

While not directly opposing OSI, IBM from time to time has involved itself in the OSI movement. At an OSI working group last November, the European Computer Manufacturers Association proposed that a significant portion of SNA be adopted as the nonproprietary standards for OSI. Given the hierarchical nature of SNA, this would have been at cross-purposes with the peer-to-peer concept touted by OSI.

Had the proposal been adopted, IBM would have had a clear two-year head start on the remainder of the industry in bringing OSI-compliant products to market. The proposal was defeated in early 1986.

An instrument for the future

Although the first fruits of OSI are just now coming to market, OSI is an effort that will be instrumental for years to come. Far from a technological exercise, the work accomplished through OSI will significantly impact the end-user network.

By consistently standing by its charter of providing a system for worldwide communications — regardless of the technology involved or the vendor equipment — OSI will provide corporations with the flexibility to design and manage their networks to their own strategic advantage. ◻

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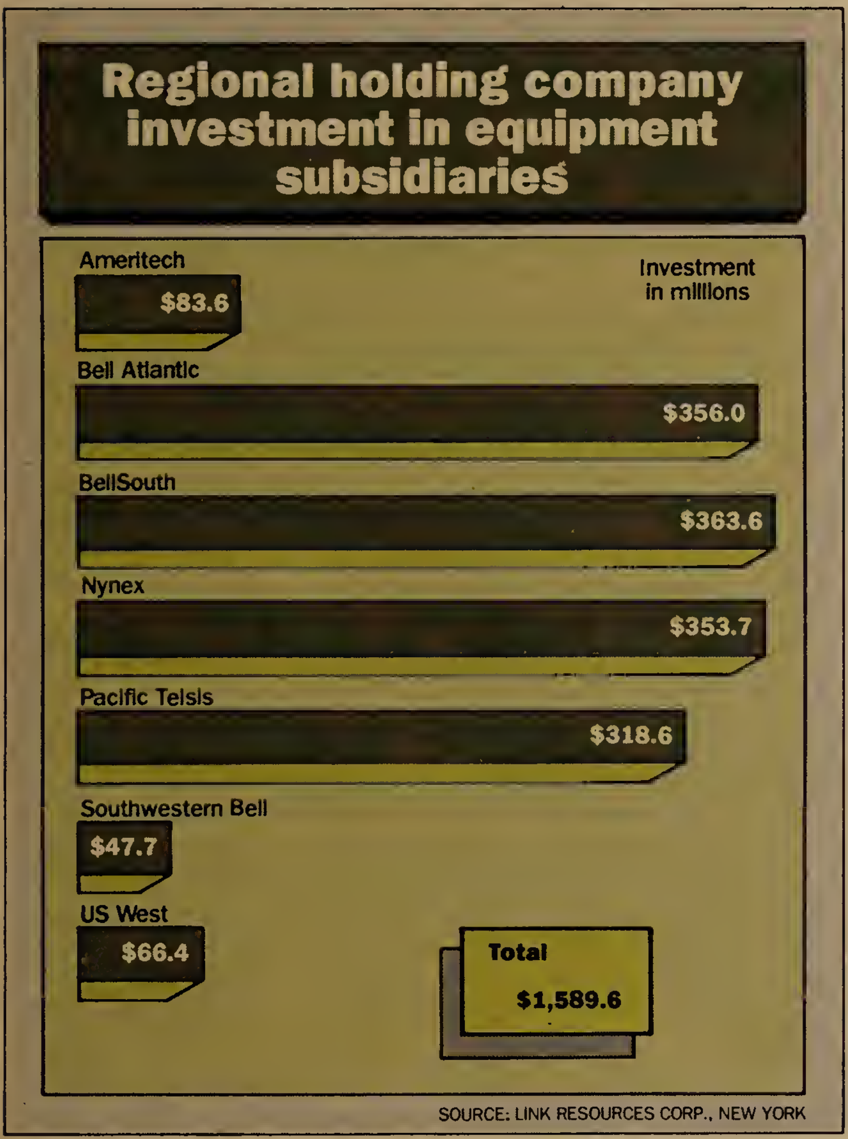
TELECOM TRENDS

Digital Microwave's millionth mile

Digital Microwave Corp., a supplier of short-haul transmission products to Bell operating companies, Fortune 500 customers and AT&T, under a private label agreement, reported recently that it has shipped more than a million circuit miles of microwave communications equipment. The company was founded in early 1984 by three former employees of Farinon Corp. and Harris/Farinon division, vendors of similar microwave devices.



SOURCE: LINK RESOURCES CORP., NEW YORK

AUTOMOBILE MARKETING

GM forges its own nationwide net

Subsidiary EDS begins construction of network aimed at more than 5,000 dealers.

BY BOB WALLACE
Senior Writer

WARREN, Mich. — General Motors Corp. said last week that its Electronic Data Systems Corp. (EDS) subsidiary has begun building a nationwide communications network that will offer on-line access to corporate information to more than 5,000 Chevrolet division dealers.

Total Information Management Systems (Tims) will provide access to virtually all Chevrolet- and GM-maintained data bases. Any dealer equipped with a personal computer will be able to receive data downloaded from one of the Chevrolet division's 22 branch offices. Also, through a newly created marketing center here, a dealer may access marketing data maintained at an EDS Information Processing Center (IPC) in Plano, Texas, and several other Chevrolet and GM data bases.

The marketing center will be opened in January and is expected to be fully operational by late summer 1987. EDS declined to describe the communications link between the marketing center and the IPC in Texas, and the type of lines over which data would be transmitted from the branch offices to the individual dealer locations.

EDS has reportedly written the custom software that specifies the manner in which requested data is displayed. A GM spokesman said the EDS software allows staffers without a great deal of computer

See **Tims** page 16

CROSS TALK
JOHN DIX

Centrex catalysis due?

Rumors concerning a codevelopment relationship between Ameritech, Inc. and David Systems, Inc., a manufacturer of voice/data processors, may signal a new generation of Centrex services that combine central office services with customer premises-based equipment.

Although neither company would confirm it, the regional Bell holding company is rumored to be investing $3 million in David Systems. The reason for the investment is unclear, but some industry observers guess that Ameritech hopes the young company will help it improve the data-handling features of its Centrex service.

Yes and no.

David Systems makes departmental voice/data processors meant to augment Centrex services and older analog private branch exchanges by integrating voice and data. The departmental systems, which are installed using existing wiring, provide enhanced phone features and high-speed data support.

Instead of looking to David Systems to develop central office switch technology, it is more likely that Ameritech is exploring the idea of using products like the David Information Manager to make Centrex more attractive.

In fact, some large customers looking for new telecommunications systems will not even accept Centrex bids today unless they are proposed with adjunct customer premises equipment that provides features on par with modern PBXs.

Although local telephone companies have made strides in their efforts to provide data support, Centrex simply isn't the best vehicle for local data communications requirements. Each data link typically must be routed out to the serving company's central office switch and back over questionable twisted-pair facilities. It makes better sense, as Ameritech may have learned, to contain data communications within the customer's building. Distances are minimal, higher speed data sup-

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SATELLITE SERVICE

Nova-Net takes small bites into Vsat market

Company addresses small customers.

BY BOB WALLACE
Senior Writer

ENGLEWOOD, Colo. — Nova-Net Communications, Inc., a reseller of very small aperture terminal satellite services, is trying to establish a niche in the young Vsat market by catering to users with fewer than 100 network sites.

Nova-Net currently resells Equatorial Communications Co. Vsat systems, including station equipment, C-band satellite transponder space and installation and maintenance services. Eventually, the company intends to migrate users from Equatorial-based C-band systems to its own Ku-band system, which the company hopes to have operational by 1988.

While established Vsat network providers cater to corporations with at least 100 remote sites, Nova-Net has focused on smaller, mostly ignored customers with fewer locations to support.

Part of the appeal of Nova-Net is the elimination of all leased-line connections. The lion's share of companies that have installed Vsat nets in the past two years have opted to use the master earth station facilities of the carrier instead of installing their own. These hub stations, which may costs as much as $2 million, are typically located near the vendor's headquarters, meaning users have to shoulder the additional cost of leasing facilities to access the shared hub station.

Nova-Net offers users the opportunity to eliminate that link, which in some cases spans several thousand miles.

With Nova-Net, the customer's data processing center would communicate with Equatorial's hub station in Mountain View, Calif., via satellite. Data received at this site would then be routed, again over satellite, to the customer's remote Vsat stations.

The Nova-Net alternative to the private-line link can cost as little as $250 per month for the DP center-to-vendor hub station communications link. Nova-Net said a user opting to acquire a Vsat net from the company should expect to pay $250 to $450 per Vsat net site, per month.

▶ INTERNATIONAL NEWS

AT&T, BellSouth expand

CW Communications International News Service

TOKYO — AT&T has belatedly agreed to join Japan ENS Corp., a value-added network company here that has been inoperative for over a year. Under the terms of the agreement, the U.S. telecommunications giant will invest $11.9 million and gain control of half the firm. AT&T's participation will double the capitalization of the 19-member company to $23.9 million.

METZ, France — Atlanta, Ga.-based BellSouth Corp. recently signed a preliminary agreement with the city of Metz to install a telecommunications research center here. One of the seven regional Bell operating companies that was spun off from AT&T in January 1984, BellSouth is the first to expand into France.

The growing deregulation of telecommunications services here promises a competitive market for private firms. Metz recently petitioned the French government for the right to become a teleport, an open telecommunications zone freed from the control of the state-run Post Telegraph and Telephone Administration.

Centrex from **page 15**

port is feasible and data integrity is ensured.

Local telephone companies that combine Centrex with departmental systems may, in fact, give PBX vendors a run for their money. For voice, Centrex provides the usual benefits of high availability and reliability, hassle-free management and low-cost entry. Add the enhanced telephony functions and high-speed data support of departmental systems, and Centrex looks like a rejuvenated contender.

The fly in the ointment, however, is a regulation that says the former Bell operating companies can't own equipment that is installed at the customer's site. Some of the BOCs have gotten around this by installing equipment in closets or equipment rooms leased from their customers. Ameritech may have the same idea in mind or may be simply covering its bases, investing in one of the leading manufacturers of customer Centrex adjunct equipment in anticipation of deregulation.

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▶ COMPUTERS AND COMMUNICATIONS

IC&C to hold industry convergence colloquy

Conference intended as meeting ground and technological roundtable.

RESTON, Va. — International Computers and Communications (IC&C) will hold a conference here on the convergence of computers and communications in the international market on Oct. 22 to 25.

The WorldCom Executive Conference is designed as a meeting ground for executive-level government officials, vendors and users from around the world. Participants will discuss technological trends, applications, government telecommunications and trade policies and business strategies.

This is the sixth year for the WorldCom Executive Conference, although little has been heard about its sponsor, IC&C. Founded as a nonprofit educational and consulting organization, its objectives are to promote the global expansion of the computer and communications industries. IC&C recently moved from San Francisco to the Washington, D.C. area.

"This is the only international forum providing an opportunity for personal contacts among computer and communications leaders from the U.S., Europe, Asia, Africa and Australia," said IC&C President Carin Christian.

IC&C's sponsors include the U.S. Department of Commerce, International Telecommunications Satellite Organization, CIT-Alcatel, General Electric Information Services Co., Telenet Communications Corp., Tandem Computers, Inc. and the International Communications Association.

Speakers at the upcoming conference will be Richard Colino, director general of Intelsat; George DeBakey, deputy assistant secretary for the U.S. Department of Commerce; Clark Norton, foreign affairs adviser to the U.S. Department of State; Seth Blumenfeld, president of MCI International; and Richard Stern, chief of telecommunications for the World Bank.

A computer teleconference will be held during the meeting, at which time attendees will be able to communicate with Richard Butler, secretary general of the International Telecommunications Union in Geneva (the international equivalent of the U.S. Federal Communications Commission), and Arthur C. Clarke, science fiction writer and satellite expert, of Sri Lanka.

Tims from **page 15**

training to access desired information easily.

Jim Corbett, operations manager of the marketing center, said use of the Tims is expected to substantially improve the sales, marketing and administrative support Chevrolet provides its dealers.

"In the past, most of the data would be automated at the zone office level, printed and distributed to Chevrolet's field service staff, who would deliver the information, in person, to each individual dealer," Corbett explained. "By the time this critical data was delivered, it was one to three weeks old."

> *"Use of the Tims is expected to improve sales support."*

The individual data bases, which can only be accessed by marketing center staffers, allow users to trace vehicle orders to determine estimated delivery date, find possible solutions to mechanical problems by inputting the vehicle serial number and the specific problem, and to access sales bulletins and on-line technical service literature.

A Chevrolet dealer would request data from one of the 22 branch offices or the Chevrolet marketing center. The data would be downloaded to the dealer site, where it could be viewed and discussed with the dealer support staffer who would be on the other end of the phone line. At the marketing center, the data would be accessed using IBM Personal Computer ATs. Branch office staffers are equipped with IBM 3270 Personal Computer ATs.

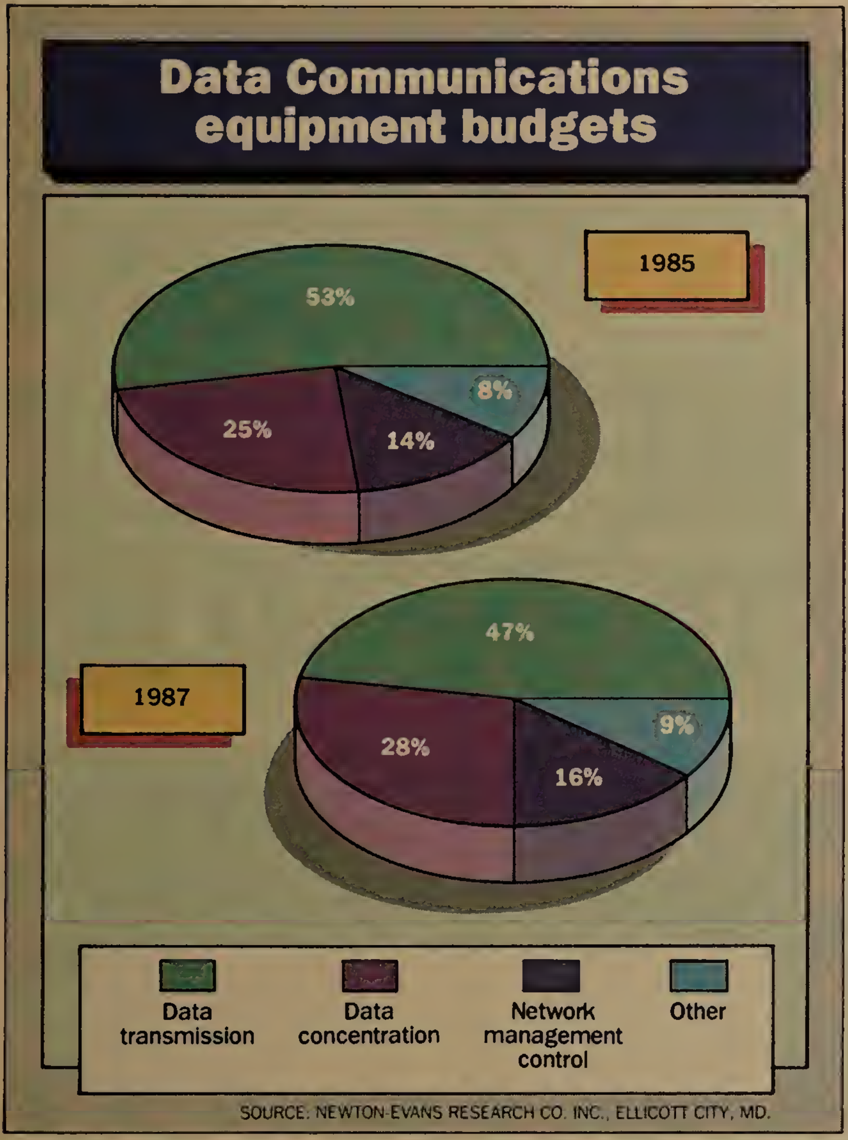
Chevrolet dealers will not be forced to purchase IBM Personal Computers that would be used to display downloaded data. Corbett said the dealer device of choice for Tims has not yet been decided upon, but it will probably be some type of IBM Personal Computer.

The dealer's choice of which location to contact depends on what type of information is sought. Corbett said staff at the branch offices would be best equipped to handle questions concerning contractual matters, service improvement programs, customer service efforts and general information about other dealer locations.

The marketing center staff would field questions about dealer lists and profiles, vehicle distribution plans, warranty services and sales and marketing literature needs.

DATA DELIVERY

> “Some users are shying away from IBM’s Netview because they do not want to dedicate an expensive mainframe to network management. These users may be very interested in the new IBM 9370 line because they would be able to run Netview on a relatively inexpensive machine.
>
> **Frank Dzubeck**
> President
> Communications Network Architects, Inc.
> Washington, D.C.



Data Communications equipment budgets

SOURCE: NEWTON-EVANS RESEARCH CO. INC., ELLICOTT CITY, MD.

PROTOCOLS

TCP/IP standards gain vendor boost

New products debut from Excelan and Novell/Micom-Interlan joint effort.

BY MARY PETROSKY
West Coast Correspondent

The Department of Defense’s Transmission Control Protocol/Internet Protocol gained new advocates this month, as a number of vendors introduced products based on the communications standard.

Novell, Inc. and Micom-Interlan, Inc. used the Dexpo West show in San Francisco to demonstrate a jointly developed gateway product that performs conversion between the Novell Netware Internet Packet Exchange (IPX) protocol and TCP/IP. IPX is Novell’s version of the Xerox Network Services (XNS) protocol.

Excelan, Inc. unveiled Ethernet network software that works with the company’s existing line of expansion boards and supplies support for TCP/IP protocols to IBM RT Personal Computers. Excelan has been a major supplier of TCP/IP products and the latest offering was an extension of its product line.

Novell moving into government mart?

Novell’s move to support TCP/IP could signal a major push by the company into the government and engineering marketplaces, according to Daniel Lynch, president of Advanced Computing Environments in Cupertino, Calif.

Lynch noted that an increasing number of personal computers, many of which are IBM Personal Computer-compatibles sup-

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DATA DIALOGUE

PAUL KORZENIOWSKI

The future’s unclear as fickle fortune blows hot and cold for DEC and IBM

How quickly the winds of fortune shift in the computer industry. Two years ago, Digital Equipment Corp. was up against the ropes. Profits and revenue were down. The company’s foray into the personal computer market was an unmitigated disaster. Hiring freezes were put into effect. Reports said that DEC President Ken Olsen had lost his touch and was no longer able to run a large company. Analysts predicted that the company would become an AT&T subsidiary.

Instead, Olsen remained steadfastly at the helm. The company pushed its VAX architecture up and down the computer ladder. The MicroVAX became a runaway hit. DEC moved into the office automation market for the first time. All-in-One became one of the best-selling office automation applications. Profits and revenue rose dramatically. Bouquets replaced barbs. Currently, DEC can do no wrong.

Criticism has shifted to IBM. The company possesses a disjointed product line and cannot tie all of its systems together. The result is that sales have slowed and inventories are at an all-time high. Early retirement plans are being implemented. For the first time since the Depression, IBM will report two consecutive declines in yearly profits. There are whispers that IBM Chairman John Akers does not have the touch needed to manage a large company.

One should not be too surprised to find IBM in this position. A lot of the company’s problems stem from its tremendous success. IBM has an unwieldy product line because it competes in almost every computer market. At the time when these markets were emerging, no one was really thinking about the need to tie different systems together.

Instead, companies attempted to supply the best price-for-performance in a particular market. For IBM, the result was a plethora of products with different architectures. Tying them all together has proven to be close to impossible.

IBM has been forced to retrench, a situation that DEC was in a few years ago. The company had to decide which products were the most important. Faced with a number of difficult decisions, IBM has moved to strengthen its long-term position.

The first step was limiting the number of architectures the company had to support. Since the beginning of the year, the company has announced that 8100 was being phased out, and the Series/1 would be used primarily as a communications processor.

Pieces of IBM’s communications strategy were also put in place. LU 6.2 is on its way to becoming a de facto standard, and Netview will become the industry’s most popular network management tool. The Token-Ring

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IBM INSIGHTS

Just how bad is bad? Recently, IBM has been taking a lot of heat because of Digital Equipment Corp.’s upsurge. However, a number of companies would gladly trade places with Big Blue. Analysts report that the company has solidly secured second place in the mid-range market and trails DEC by as few as three percentage points in market share.

IBM is well ahead of competitors like Wang Laboratories, Inc., Data General Corp. and Hewlett-Packard Co. IBM’s history of tremendous success has put the company in an unenviable position. Unless Big Blue completely dominates its competitors, its performance is deemed a failure.

■

No overlap, here, just some extra cash. The announcement of IBM’s 9370 processor line created some confusion in Big Blue’s product line. The mid-range family overlaps existing 4300 systems and the System/36. Some analysts criticized IBM and said that the muddled product lines may reduce revenue. David Moschella, vice-president at International Data Corp., a Framingham, Mass., market research firm, said that IBM cannot easily lop off product families. Revenue from its individual lines often rivals that of a com-

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plied by Zenith Data Systems Corp., are being purchased by government agencies. Many of these personal computers are being added to existing Ethernet networks, which use TCP/IP to communicate across a range of computer systems on a network.

Although the industry is moving toward protocol independence through adoption of the International Standards Organization's (ISO) Open Systems Interconnect (OSI) standards, finalization of such standards is still years away, Lynch said. "[TCP/IP] is the ISO interim solution."

Novell's Netware TCP Option, slated for release in the first quarter of 1987, will allow personal computer and terminal users on TCP/IP networks to transfer files to and from an Advanced Netware 286 file server.

Personal computer users on Netware networks will be able to access other computer systems on TCP/IP networks, including hosts. Bidirectional file transfer and terminal emulation will be provided through TCP/IP services.

The Netware TCP Option is based on the Micom-Interlan NP600 protocol processor and software, largely developed by Novell, to support the server and workstation. Both companies will market the product.

Providing support for TCP/IP is another move by Novell to become protocol independent, according to Dave Williams, Novell's director of strategic marketing.

"This is a logical evolution for Novell," said Williams. "What we're striving to do is branch out and broaden our connectivity. We started out developing a media-independent product and, with the confusion over standards, it seems logical that we treat protocols in a similar fashion."

In addition to IPX and now TCP/IP, Novell also supports Netbios as middle-layer protocols.

Universal Network Architecture is what Novell has dubbed its strategy of supporting multiple protocols across various layers of the OSI model.

As part of this strategy, Novell is looking to expand beyond its current work group and departmental networking solutions to develop products aimed at networking across user premises, campus environments and wide areas.

For this reason, Novell will be striking strategic alliances with other vendors, said Dave Williams, Novell's strategic marketing director.

"Micom is very strong at the premises level, so that marriage is very logical for us. At the campus and wide-area [levels], we've got some things in the fire," Williams said, though he did not elaborate.

Novell will continue to focus on software, he said. Williams pointed to network services as "the real issue" facing local-area network users. Network services include electronic mail, file management, security, print and backup services as well as file transfer.

"With the Netware products," Williams said, "our services are high enough in the protocol hierarchy, we can virtually plug in protocols and run our services unchanged."

> *"Novell is looking to expand beyond its current work group and departmental networking solutions to networking across user premises, campus environments and wide areas."*

Excelan's EXOS 8016-01 network software works with the company's Intelligent Ethernet Controller board to support TCP/IP protocols. Excelan boards work like a front-end processor, off-loading communications processing functions from a central computer system.

Excelan developed the package in conjunction with Interactive Solutions, Inc., the company that helped IBM design the RT Personal Computer's operating system. The package includes applications, utilities such as file transfer protocol, a file transfer program, a terminal emulation program and various Unix electronic mail capabilities. With the package, an RT Personal Computer is able to communicate with systems such as Digital Equipment Corp.'s VAX system, NCR Corp.'s Tower system, and Sun Microcomputers, Inc.'s workstations. The product costs $1,295. ◻

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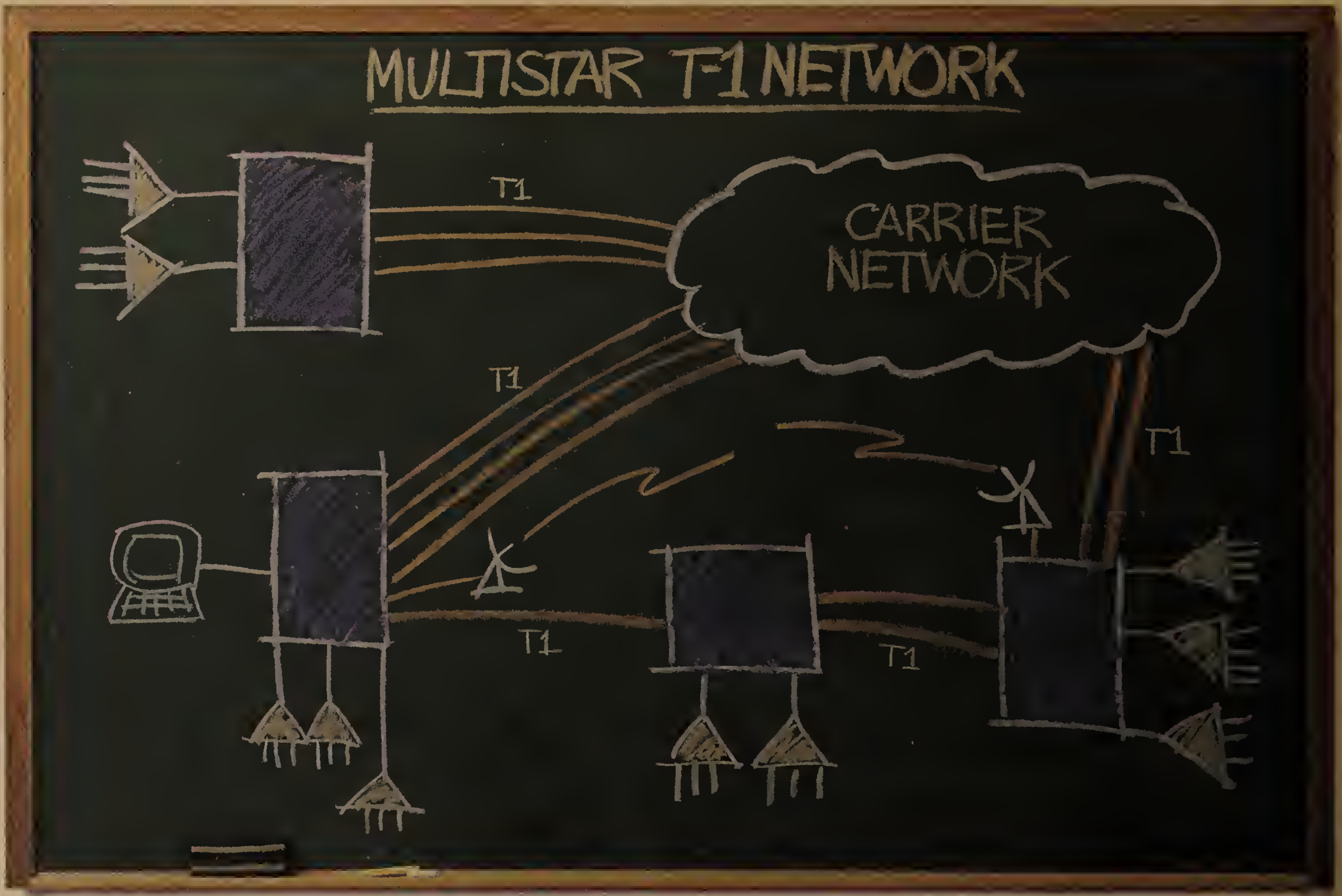

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The point is, we've years of experience and expertise built into all our hardware.

IBM from **page 17**

Network has been linked to a number of IBM systems. The company announced Advanced Peer-to-Peer Networking, an architecture that would enable customers to tie a number of mid-range systems, such as the System/36, onto a local-area network.

The company also moved aggressively into traditional voice markets. Rolm Corp.'s CBX line is being pulled under the Systems Network Architecture umbrella, and IBM is now offering tariff software for its customers.

Strategic alliances were formed with companies in emerging markets. Industrial Networking, Inc. will help IBM in the factory market, an area in which IBM had virtually no presence. Network Equipment Technology is working with IBM to solve customers' needs in the T-1 market.

Frank Dzubeck, president of Communications Network Architects, a Washington, D.C. consulting firm, said that 1986 was IBM's year of announcements. Next year will be the year of products.

Announcements do not contribute to a company's bottom line, so IBM revenue will continue for the short term to alarm stock watchers. If IBM can deliver its products next year, the company's economic outlook will improve.

DEC's star may not shine forever. The company has pushed the VAX architecture up and down the computer system ladder as far as possible. The result has been tremendous success. However, a problem with success is that stockholders are never satisfied with it. DEC's success has not escaped IBM's watchful eye, and the company's recent 9370 announcements are targeted at DEC's VAX line.

> *“Strategic alliances were formed with companies in emerging markets. Industrial Networking, Inc. will help IBM in the factory market.”*

The VAXmate, DEC's recently announced microcomputer, should be a big seller and could help continue DEC's present momentum for the short term. Other companies are moving to tie their products into Decnet. Previously, only IBM commanded such respect.

But long-term success depends on DEC's ability to move into new markets. The company seems to be lagging behind its competitors.

Wang Laboratories, Inc. has teamed up with two private branch exchange companies — Intecom, Inc. and Telenova, Inc. DEC has yet to form one such alliance. The company has yet to develop any type of T-1 support and has no competitor to Netview.

DEC faces other challenges. Pieces of its network, such as its terminal servers, are based on ancient technologies. These products have to be improved.

Other companies are shooting at Decnet weaknesses. Two Decnet designers have formed start-up companies with products that focus on these weaknesses.

No one knows how long the VAX momentum will last. If it begins to slow anytime soon, the winds of fortune may once again shift. ◪

Insights from **page 17**

petitor's entire organization. Even if the overlap creates some confusion, IBM stands to gain more income than it loses.

Getting from here to there. Included in the 9370 announcements was IBM's first protocol converter for System/36 and System/38 processors. The IBM 5209 Model 1 connects a System/36 to up to seven 3270 sessions. A user is able to toggle between System/3X and 3270 sessions with one key. The product costs $5,595 and will be available in the third quarter of next year.

Service with a smile. IBM also moved into the service arena with a series of Solutionpacs, so IBM can help a customer design, install and maintain an application or a certain product. IBM offered this support for its local-area networks and VM operating system. The Expert System Solution Pac is an interesting item. It consists of software and training that enables a customer to develop an expert system. Frank Dzubeck, president of Communications Network Architects, Inc., a Washington, D.C. consulting firm, said that the new services could provide IBM with an additional source of revenue. With computer sales slumping, Big Blue is looking to other areas to pick up slow sales. Software and service are two areas where IBM could pick up a lot of additional revenue. ◪

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T-1 Open Systems Integration (OSI)— A Technical and Strategic Review

Leader: Harold C. Folts, Executive Director, OMNICOM, Inc.

Enroll in this intensive one-day tutorial for a thorough understanding of the concepts and terminology of OSI, a working knowledge of the OSI architecture, an introduction to the seven layers of OSI protocols, and expert guidance in applying OSI to the evolution of distributed information systems. *Level:* Intermediate.

T-2 ISDN—Status and Developments

Leaders: James G. Herman, Director, and Mary A. Johnston, Senior Consultant, Telecommunications Consulting Group, BBN Communications

In this tutorial you'll learn what ISDN will and won't deliver in the late 1980s, what the emerging ISDN standards will mean for new services and improved network performance, what holes still exist in the standards and trials, how to make smart buying decisions while keeping open your options for ISDN compatibility, and more. *Level:* Intermediate.

T-3 Strategic Planning for Corporate Information Networks

Leader: Dr. Howard Frank, Howard Frank Associates

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T-4 Planning and Designing Networks with the New Technology

Leader: Dr. John M. McQuillan, President, McQuillan Consulting

In this intensive seminar, you'll get acquainted with the key architectural principles used by today's leading network planners. You'll review emerging technologies such as T-1 networks, hybrids, VSATs, gateways between SNA, LANs and X.25, micro-mainframe links, intercompany networks, and more. *Level:* Advanced.

T-5 Building the Network Management and Technical Control Facility

Leader: Gabriel Kasperek, President, Kazcom, Inc.

This one-day course will help you understand the strategic value of network control, explore alternative technologies for managing your network, and discover how to evaluate current technologies for use in your own organization. You'll become familiar with the test equipment you need for successful network control and understand industry trends and future directions. *Level:* Introductory–Intermediate.

T-6 Designing Voice and Data Networks under the New Tariffs

Leader: Robert L. Ellis, President, The ARIES Group Inc.

Take this tutorial to learn the structure of the post-divestiture tariffs, the latest January 1987 changes to these tariffs, how to price interstate private lines, how to configure and price interstate FX services, the new economics involved in configuring data networks, the LATA-pure strategy, and more. *Level:* Intermediate.

T-7 Managing the Telecommunications Resource

Leader: Gerald P. Ryan, President and Founder, Connections Telecommunications Inc.

This one-day course briefs you on how to develop a successful management environment. You'll learn what tools are available to do your job more professionally, how to plan a network management center, how to staff and train the department, and how to prepare and substantiate departmental budgets. *Level:* Intermediate.

T-8 IBM Token-Ring Versus Other LAN Choices

Leader: Dr. Kenneth J. Thurber, President, Architecture Technology Corp.

This tutorial gives you an across-the-board overview of announced products, future plans, compatible products, and IBM's overall strategy with respect to Token-Ring technology. You'll discuss the Token-Ring's relationship to IEEE 802.5 and get an in-depth look at NETBIOS and APPC/LU 6.2 interfaces, and more. *Level:* Intermediate.

T-9 VSAT Technology and Implementation

Leader: Dr. Jerome G. Lucas, President, TeleStrategies Inc.

Learn the basics of applying very small aperture terminal (VSAT) satellite communications to your networking needs. You'll get acquainted with basic application requirements in SNA networking, data broadcasting, PC networking, video broadcasting, and teleconferencing. *Level:* Intermediate.

T-10 IBM's Systems Network Architecture (SNA): A Detailed Road Map

Leader: Daniel Zatyko, President, Zatyko Associates

Enroll in this intensive one-day tutorial to understand the evolution of SNA, and learn fundamental SNA concepts, the seven SNA architectural layers, SNA's physical and logical addressing, strategic SNA products, components of NetView, Token-Ring networks, functionality and capabilities of the LU 6.2/APPC and NETBIOS interfaces, and more. *Level:* Intermediate.

T-11 An Introduction to Data Communications Today

Leader: Gary Audin, President, Delphi Inc.

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Leader: Richard E. Wiley, Senior Partner, Wiley, Rein & Fielding

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FACTORY COMMUNICATIONS

Sunlink OSI upgraded

Sun Microsystems, Inc. introduced a new version of its Sunlink OSI software that will enable factory networkers to link Sun workstations to networks that comply with the Manufacturing Automation Protocol Version 2.1. Sun claims the software implements all seven layers of the factory communications specification.

▶ FACTORY AUTOMATION

IBM uncloaks industrial micro as network gateway

Attaches directly to MAP local nets.

BY BOB WALLACE
Senior Writer

RYE BROOK, N.Y. — In a move designed to widen its range of factory networking alternatives, IBM recently took the wraps off of an industrial microcomputer that can be linked to shop floor devices, IBM's Personal Computer and Token-Ring Networks and the newly unveiled 9370 Information Systems.

The company claims its 7552 Industrial Computer is the first of its industrial computers that can be connected to its broadband, Token-Ring Network. The 7552 is designed to operate as a gateway through which IBM hosts can communicate with factory automation devices such as robots or programmable controllers. The unit can serve as a manufacturing cell controller or as a factory floor workstation.

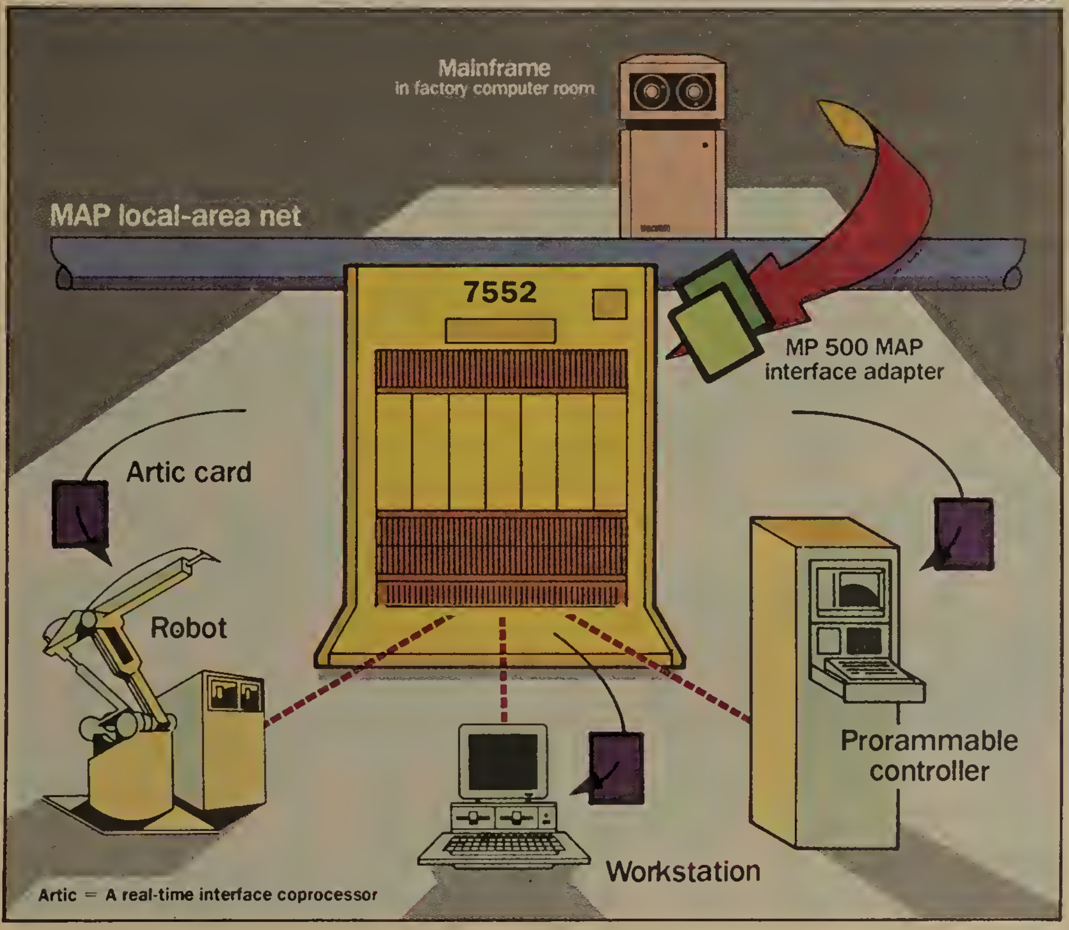
IBM said it will be demonstrating in New York this week how the new industrial processor can be linked to its just-unveiled 9370 line.

The factory floor processor can be directly attached to a Manufacturing Automation Protocol-compatible local net using IBM's two-board MP-500 MAP Interface Adapter ("IBM, INI dance MAP duet, *Network World*, Sept. 8). IBM said multiple programmable controllers from Allen-Bradley Co., Gould, Inc., Texas Instruments, Inc. and General Electric Co. can also be hooked to the 7552 using IBM's A Real-Time Interface Coprocessor (Artic) cards.

The introduction of the shop floor computer will provide factory networkers with an additional means of hooking Personal Computers to a MAP network. Now, these devices can be attached to either IBM's PC Network or Token-Ring Network, which, in turn, can be linked to the 7552.

IBM is also currently working with Ford Motor Co. to develop a means of running its PC Network over a single channel of a broadband, plantwide, local-area network ("IBM, Ford combine on PC LAN," *Network World*, April 21).

IBM 7552 industrial computer as a manufacturing cell controller



Artic = A real-time interface coprocessor

The two new Personal Computer networking alternatives will allow factory networkers to locate groups of these devices further away from the plantwide net than would be possible using the PC Network-over-broadband local net scheme.

In one application, the IBM 7552 could be used to control the operations of a series of welding robots in a self-contained manufacturing area commonly referred to as a cell. In this scenario, an IBM mainframe located in the factory's computer room could download part programs over the MAP network to the IBM cell controller, which would, in turn, pass these programs to the welding robots.

The industrial computer, which houses a 10-MHz Intel Corp. 80286 microprocessor and is compatible with IBM's Personal Computer AT, is said to be the first IBM factory floor computer that monitors and controls manufacturing operations without an operator in attendance. Software designed for the Personal Computer AT, or the company's 7531 and 7532 industrial computers, will also run on the IBM 7552 processor.

This factory processor, available in two versions, can be used in stand-alone or rack-mounted modes, or can be installed in factory-hardened enclosures. A keyboard and display are not required to operate the unit as it can be programmed using an 7531 or 7532.

A Model 040, equipped with 512K bytes of memory, malfunction indicators and seven expansion slots, costs $6,770. The Model 140, which features an additional disk adapter card, a 10M-byte fixed disk drive and five expansion slots, is priced at $9,370. The IBM 7552 Industrial Computer and related software will be available in the first quarter of 1987. ☒

FACTORY FACTS

GEORGE KOSHY AND ANUPAM SACHDEV

Fitting the net block to the net slot

Second of a two-part series.

Last week we discussed how developments in the communications and computer industries impact a factory networker's system planning, procurement and installation efforts.

The network life cycle identifies the different steps involved in the design, implementation and operation of a factory network.

Information environment analysis. The factory networker must first understand the environment in which the system will operate. Definition of this information environment must include an understanding of management objectives and constraints, functional consideration of users, characteristics of environment, overall performance goals, availability and reliability goals and network security needs.

Applications environment analysis. The applications environment defines the nature of the functional applications that will assist users in the performance of their tasks.

A complete description of the application environment will include information concerning the type of information to be transferred over the net, types of applications to be run on the net, the geographic location of users, existing hardware and software resources and the location of software

See **Life cycle** page 22

Koshy and Sachdev are associates with Booz, Allen & Hamilton, Inc. in Lexington, Mass.

Life cycle from **page 21**

programs and data.

Traffic analysis. The traffic anlysis phase of the network development cycle will quantify data transfer requirements specific to applications architecture. This analysis will quantify the sources and destinations of transmitted data, the frequency of data transfer over the net and the volume of data transfer.

Network architecture definition. The network architecture identifies the network components and their interrelationships. A wide array of technologies is available to the factory networker. The selection of the appropriate network architecture is crucial to the successful implementation of the manufacturing network.

The major components of the network are network stations, applications software, network transmission media, networking hardware and software, network servers, interconnection devices and the network's management system.

Implementation and operation strategy development. After the definition of the network architecture, a strategy for the implementation and operation of the factory net must be developed.

This plan will comprise four components: network acquisition, network development, system installation and staff training.

The network acquisition component of the implementation plan will specify the procedure for acquiring the hardware and software that make up the net. This will include vendors, components costs and schedules for the procurement of these network components. This strategy should also specify the procedures, costs and schedules for the development of software necessary for the operation of the factory net.

The installation aspect of the implementation plan should identify the procedures, costs and schedules for network installation. It will also specify the network wiring plan, the layout of the transmission media and the related hardware and software configurations. The training of staff to operate and maintain the network must also be taken into consideration.

The network operations plan should define the policies and procedures required for network operation.

These functions include network resource allocation, system configuration, security, network diagnosis and fault location and network performance monitoring.

Implementation. The actual installation of the factory network will involve all major components identified in the implementation plan.

Operation. Operation of the factory floor network includes such functions as adding users to, or deleting users from, the network, assigning specific network resources to users, configuring the net, day-to-day monitoring of the net, the ability to locate and isolate network problems and control of access to the net.

A clear definition of the steps identified above will help the factory networker with the conceptualization and design of the network, its implementation and its operation.

The network life cycle development should be the first action taken toward establishing a factory floor network.

INCIDENTALS

Manufacturers may wish to attend a pair of plant floor networking seminars to be held next week. "Designing and Implementing a MAP Cable Plant" will be held at Arizona State University's (ASU) Engineering Research Center on Oct. 29 and 30. For additional information on the course, which costs $550, contact ASU's Center for Professional Development at (602) 965-1740.

"MAP/TOP: Networking in Industrial Environments," will be offered Oct. 29 to 31 at Integrated Computer Systems' (ICS) facility in Los Angeles.

For more information on the mini-course, which costs $995, contact ICS at either (800) 421-8166 or (213) 417-8888.

*

Ship Star Associates, Inc., of Newark, Del., is offering a one-day seminar entitled, "MAP and TOP, The Key to CIM," on Oct. 30 at the Corner Marriott in Vienna, Va. For additional information on the seminar, which costs $275, contact Ship Star at (302) 738-7782.

*

The Society of Manufacturing Engineers (SME) has introduced a three-day workshop entitled "Fundamentals of Industrial and Manufacturing Engineering," to be held Dec. 2 to 4 at the Sheraton Commander Hotel in Cambridge, Mass. For further information on the seminar, contact SME at (313) 271-1500, ext. 394.

*

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COMMUNICATIONS MANAGER

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> **Gary Kern**
> Consultant
> Coopers & Lybrand

NETWORK MANAGEMENT

Users told to seek overall self-control

Net security is topic of NUA meeting.

BY MARGIE SEMILOF
Senior Writer

DENVER — Network management, control and security, which remain among the primary concerns of communications managers, were the major issues addressed at a meeting of the Network Users Association (NUA) recently held here.

Approximately 100 users attended the keynote speech at which Judy Estrin, executive vice-president at Bridge Communications, Inc., highlighted some of the most important network management concerns of both users and vendors.

“Users must think about network management before and during the installation of their networks,” she said. “The subject is complex and specific to each environment.” Estrin suggested users conduct test operations at each stage of building their networks — as they install cable, as hardware is deployed and again before any peripheral devices are put in place.

“[With network management], it isn’t enough to ask your end users if they are happy,” she added. “You must continually be looking out for potential bottlenecks.”

Most managers echoed the notion that security should play a larger role in overall network management. “It’s important to define what level of access control you want,” Estrin said. “But it is also not enough to have access control. Managers also must have some kind of security log so they can tell if someone is constantly trying to break into the system.”

“Some think network management and security are separate issues,” said James Fortney, manager of management systems planning at Litton Data Systems in Van Nuys, Calif. “But you aren’t going to manage your network if you aren’t managing security.”

Some managers said the continued acceptance of the Open Systems Interconnect (OSI)

See **NUA** page 26

GUIDELINES

ERIC SCHMALL

Pact talks demand tact

Mastering contract negotiations is a fine art. While every vendor organization offers purchase and maintenance agreements for its product line, most contracts neglect some details of interest to many users or provide unacceptably low levels of protection.

At the Communications Managers Association’s annual meeting recently, James Gordon, president of TCS Communications Consultants in Nashville, offered advice for both first-time contract negotiators and the more seasoned contract wheeler-dealers. Although it’s always critical for users to strive toward maximizing their leverage with any vendor, it is also important to remember that you are trying to establish a long-term working relationship with this organization, Gordon says, adding, “You have to be fair. Otherwise, it may come back to haunt you.”

The object of all contract negotiations is to reach a win-win situation in which both user and vendor are satisfied. Contracts are simply a tool to get equipment installed. Once the equipment is in place, the maintenance agreement becomes more critical than the contract. During the stages of dickering, many users tend to forget whose side of the negotiating table they are on. Users are subject to a great deal of vendor wooing, and the two parties may often become friends in the process.

“Most people tend to buy on emotion,” he says. “How often do you buy millions of dollars of equipment from someone you don’t like? But users must always remember their own company objectives.”

If the purchase is of a private branch exchange, Gordon recommends that users work to improve the contract payment breakdown. A typical agreement may include forking over 20% upon signing the contract, 40% on delivery of the switch, 30% on cutover and the final 10% and taxes 30 days after cutover.

“A better deal may be 10% on signing the contract, 10% on accepting an installation plan, 20% on delivery of the switch, 30% on cutover, 10% 30 days after cutover and the final 20% and taxes 30 days after acceptance,” he suggests.

Users should also consider methods of financing large purchases as early as possible. Third-party financing requires an additional contract.

Gordon suggests users negotiate a warranty that begins at the time of cutover and lasts one year — instead of having it start from the time of installation.

“Keep yourself in a position to walk away from the vendor,” Gordon advises. “And be sure the vendor knows it. If the user is fair, there are very few circumstances where the vendor will walk away from the bargaining table.”

Evolution of skills from technical to managerial

Communications managers should strive to attain a larger role in the business and planning aspects of their organization, and delegate day-to-day technical responsibility.

SOURCE: GARY KERN, COOPERS AND LYBRAND

DP SURVEY

Buyers shifting focus

Budgets increase for data concentration.

BY NADINE WANDZILAK
Staff Writer

While data communications budgets grew only modestly this year, users are spending a larger piece of the budget pie on network management and data concentration equipment, according to a recently released survey by Newton-Evans Research Co.

Data communications budgets increased only 7.9% between 1985 and 1986 to an average of $1.3 million among the 132 companies surveyed. Newton-Evans interviewed data processing/MIS and telecommunications executives in manufacturing and service companies. Slightly less than 60% of the executives characterized their companies as manufacturers. The service companies encompassed such industries as transportation, insurance, business services, banking, fi-

See **Survey** page 26

SOMETHING BRILLIANT JUST HAPPENED TO DATA TRANSMISSION.

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Survey from **page 23**

nance, retailing and wholesaling.

"Budget growth was more conservative in 1986 than for any year this decade," said Chuck Newton, Newton-Evans' president.

But next year's data communications budgets will grow by 11% over current levels to an average of nearly $1.5 million, the report states. The survey group spent an average of just over $1 million on data communications in 1984, resulting in a 44% cumulative growth rate between 1984 and 1987.

Of that overall budget pie, the companies surveyed allocated 53% of their data communications budgets for data transmission equipment, 25% for data concentration equipment and 14% for network management control equipment in 1985.

By comparison, the amount projected for data transmission equipment in 1987 will drop from 53% to 47%. The amount allocated for data concentrators will rise from 25% to 28%, and for network control equipment from 14% to 16%. Figures were not collected for 1986, acording to Newton-Evans.

Specifically, users will increase the number of installed port selectors by 78% during 1986 and 1987, and multiplexers by about 53% between 1985 and 1987, the study found.

Users are shifting their budgeting away from data transmission equipment "because many large companies funded outlays for network or communications equipment from 1979 through 1984," Newton said. "Most of that budget was for transmission equipment. Now there is a slowdown because they have transmission equipment. They are focusing on what they have in place."

In addition, an investment in data concentrators can save money in the transmission area, he said.

In data transmission equipment trends, the greatest growth appears in integrated voice and data terminals — an increase of 625% from 1985 to 1987.

Installations of 56K bit/sec modems will increase by some 119% in the same time frame. The use of radio frequency microwave modems, broadband modems and 14.4K bit/sec modems is also likely to grow significantly, Newton-Evans concluded. Respondents seem to be phasing out 300 bit/sec modems, the study found.

The survey also queried users about their T-1 use. Whether a company uses T-1 depended mostly on the size of its data communications budget, the report found. Only 6% of the firms with data communications budgets of less than $100,000 use T-1, compared with 50% of the respondents with $1 million or more allocated for data.

As with T-1, the use of private packet-switching networks aligned closely with both a company's size and the size of its data communications budget. Potential growth in this area is highest among companies with data communications budgets just under $1 million, the survey concluded.

The Maryland-based research company's 96-page "1986 Data Communications Buyers' Intentions Update", compiled in July and August, is priced at $750. The seven-volume "Data communications usage trends in 'key' industries" series costs $2,750. ◼

NUA from **page 23**

model will play a key role in the push for development of standard network management and diagnostic tools for such tasks as generating problem reports and problem measurement.

However, according to Larry Comstock, a communications manager at Rochester, N.Y.-based Eastman Kodak, "At this time, while everyone is moving to an open architecture, no one is moving toward open network management."

Even without standards, some users have had success hooking together networks.

Now, they say, the goal is to monitor a variety of networks while controlling such functions as network security.

"We are hooking together a lot of different vendors' products," said Doug Taylor, data network manager at Long Beach, Calif.,-based Hughes Aircraft Co., and secretary of NUA.

"End users want information," he added. "They want the telecommunications group to string it all together. But that job isn't cheap, and it isn't simple."

During a network management committee meeting at the conference, managers convened to define several network management and security priorities that could be presented to either a standards committee, such as the Corporation for Open Systems, or to vendors as primary user concerns.

David Chagnon, supervisory communications and computer specialist with the Veterans Administration Medical Center in Little Rock, Ark., suggested that managers define their network management goals by looking at their networks as complete entities, rather than as several parts.

"Each person's network is unique," he said, "and to deal with specific networks on a generic basis is illogical." ◼

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NEW PRODUCTS AND SERVICES

See page 35 for:
▶Product focus on
baseband local-area networks

▶ NETWORK SOFTWARE

Banyan upgrade gives X.25 link

BY JIM BROWN
New Products Editor

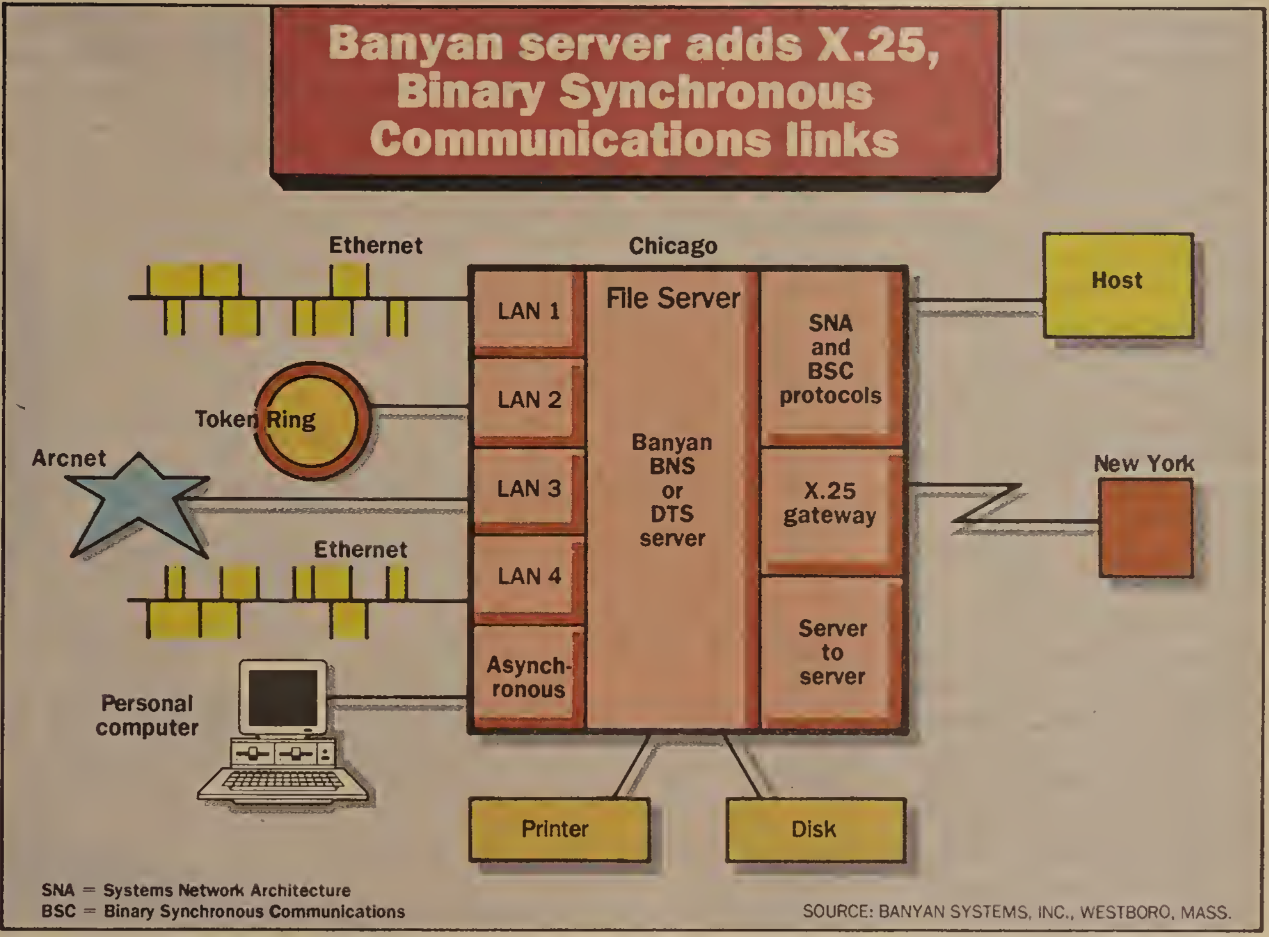
CHICAGO — Banyan Systems, Inc. recently unveiled an enhanced version of its Vines local net operating software that allows users to tie the firm's file servers to X.25 public packet-switching networks and features support for IBM's 3270 Binary Synchronous Communications (BSC) protocols.

Unveiled at the PC Expo show here, Release 2.0 of the Westboro, Mass.-based firm's Unix System V-based network operating system runs on its BNS and DTS file and communications servers. The BNS and DTS can be used to link up to four dissimilar local networks and also provide a gateway to host systems. The servers can also be used to bridge similar networks.

Vines Release 2.0 also adds Nestar Systems, Inc.'s Arcnet to the list of networks supported by the servers. Other networks supported are IBM's PC Network and Token-Ring Network, Interlan, Inc.'s Ethernet, Standard Microsystems, Inc.'s SMC Arcnet, Corvus System, Inc.'s Omininet, Proteon, Inc.'s Pronet, 3Com Corp.'s Ethernet, Ungermann-Bass, Inc.'s Net/One and Allen-Bradley's Vistalan.

The Vines upgrade will also support 9.6K bit/sec dial-up modem links between servers using Telebit Corp.'s Trailblazer or Digital Communications Associates, Inc.'s Fast-

See **Banyan** page 28



Banyan server adds X.25, Binary Synchronous Communications links

SNA = Systems Network Architecture
BSC = Binary Synchronous Communications

SOURCE: BANYAN SYSTEMS, INC., WESTBORO, MASS.

▶ LOCAL-AREA NETWORKS

Sytek steels System 2000

Synchronous subchannels, faster rates added.

BY MARY PETROSKY
West Coast Correspondent

MOUNTAIN VIEW, Calif. — Sytek, Inc. recently introduced major enhancements to its System 2000 local-area network as well as extended network management offerings.

Sytek announced a series of components that allow users to employ higher frequency channels to transmit data across System 2000 broadband networks and unveiled components that provide higher transmission rates.

In addition, users can now set up subchannels for data communications between synchronous devices. Previously, Sytek only supported asynchronous devices on the System 2000.

The new System 2000 highband products provide users with three additional 6-MHz channels, according to Van Jepson, product line manager at Sytek. Each channel can be divided into 20 subchannels, giving users with both low-band and high-band components a maximum of 120 channels on the same coaxial cable.

A key reason Sytek is offering the high-band products is to provide a sufficient number of channels for users implementing networks based on the Manufacturing Automation Protocol.

Sytek's low-band products currently overlap the channels designated for MAP.

"We're offering customers a choice of where they place their asynchronous traffic," Jepson said. High-band products include: the 2502 Highband Packet Communication Unit (PCU), priced at $1,195; the Highband Modular PCU (MPCU), priced at $4,400 for an 8-port configuration; and the Highband Network Translator, or head end, priced at $3,000. The 2555 Translator Switch, for high-band or low-band, is $4,000.

Sytek also introduced the 2602 and 2622 High-Performance PCUs, which are designed for graphics and other high-speed applications and provide data rates of up to 38.4K bit/sec. The 2602, priced at $1,295, is a stand-alone, single-port device, while the 2622 is a $695 interface board that fits in a rack-mounted MPCU.

As part of a new product family, Sytek introduced two Protocol Transparent Units (PTU) designed for terminal-to-host applications. PTUs allow users to connect devices that use the same syn-

See **System 2000** page 28

▶ OFFICE COMMUNICATIONS

Tie debuts digital telephone system

SHELTON, Conn. — Tie Communications, Inc. recently unveiled a Centrex-compatible digital telephone system.

The Data Star Hybrid will support simultaneous voice and data transmission and is positioned between the firm's Data Star private branch exchange and Data Star key system.

The 128-port single cabinet Data Star Hybrid supports up to 32 central office lines and up to 96 internal extensions in a distributed architecture. Because the Data Star Hybrid supports many features found on Tie's PBX, the firm claims it can be configured as either a PBX or a key system. The features selected for the Hybrid system are stored on proprietary microprocessors in a system cabinet.

Each of the system's central office and extension line cards also work with proprietary microprocessors. System programming information is stored in nonvolatile bubble memory. The nonblocking system also features redundant control logic, a pulse code modulation matrix and digital switching. The hybrid system also supports optional automatic fault reporting and remote diagnostics capabilities.

The cabinet will support any mix of up to 15 extension, central office or optional feature cards. Each extension card supports 16 internal telephone sets and each line card supports connection to five central office lines. The system supports optional features such as call distribution, least-cost routing, automated answering and integrated voice messaging, which allows callers to leave voice messages in a user's electronic mailbox.

A set of four Tie proprietary telephone instruments will operate on the system, including three 15-line models and a single-line model. The 15-line models are the one-line

See **Tie** page 28

Banyan from **page 27**

link modems. Also added is a feature that severs a server-to-server communications link after five minutes of inactivity.

The X.25 option links Banyan server-based local nets over packet-switched networks and supports up to 64 virtual circuits. The X.25 option reportedly does not require use of a packet assembler/disassembler. Instead, servers equipped with an X.25 communications adapter connect directly to a synchronous modem that accesses the X.25 network. Banyan servers can also be linked over leased or dial-up lines.

Personal computers attached to a network with a Banyan server will be able to access IBM mainframes using 3270 BSC protocols. The Vines upgrade makes the Banyan servers act as a remote IBM 3274 cluster controller supporting up to 32 concurrent sessions per line. The package makes connected personal computers look like an IBM 3278 terminal to the host. The host link operates at 9.6K bit/sec without the aid of a micro-to-mainframe personal computer expansion board. Both servers also support IBM's System Network Architecture/Synchronous Data Link Control protocols.

The package also includes a data caching method, reduced software code paths and new data retrieval and storing algorithms aimed at improving performance of the Motorola, Inc. 68000 microprocessor-based network servers.

The firm also announced that its DTS server will now support up to two half-height or one full- and one half-height small computer systems interface cards. The number of serial ports supported on its BNS server was also increased from 12 to 20.

Current owners of Vines software can upgrade to Release 2.0 for $995, and users with a Vines license will be upgraded at no charge. Purchased separately, the X.25 software option is $2,495, and the required X.25 communications adapter is $1,000. Software supporting up to 32 host sessions under the 3270 BSC protocol is $2,295, and a 64-session version is $2,995. The increased serial port capacity on the Banyan BNS server is priced at $895 when installed at the factory.

System 2000 from **page 27**

chronous, Binary Synchronous Communications or asynchronous protocols by the creation of a dedicated subchannel for those devices.

Pricing

The 1301 PTU, priced at $995 (high-band or low-band), operates at 38.4K bit/sec and uses an RS-232 connection.

The 1302, priced at $1,595, operates at 64K bit/sec and uses an RS-422 interface.

Sytek also announced a Network Bridge/Link Unit, priced at $9,000, that can connect channels carrying asynchronous data traffic, or connect separate networks, either local or remote.

Tie from **page 27**

LCD Executive Display, the Multibutton and the Data telephones. The system also supports an 80-button direct station selection/busy lamp field (DSS/BLF) attendant console.

The Data Star Hybrid system supports a total of 30 DSS/BLF consoles, four of which can be configured as full operator attendant consoles. The remaining 26 DSS/BLF consoles can be attached to Executive Display telephones and will function to provide direct station connections and to monitor activity on other extensions.

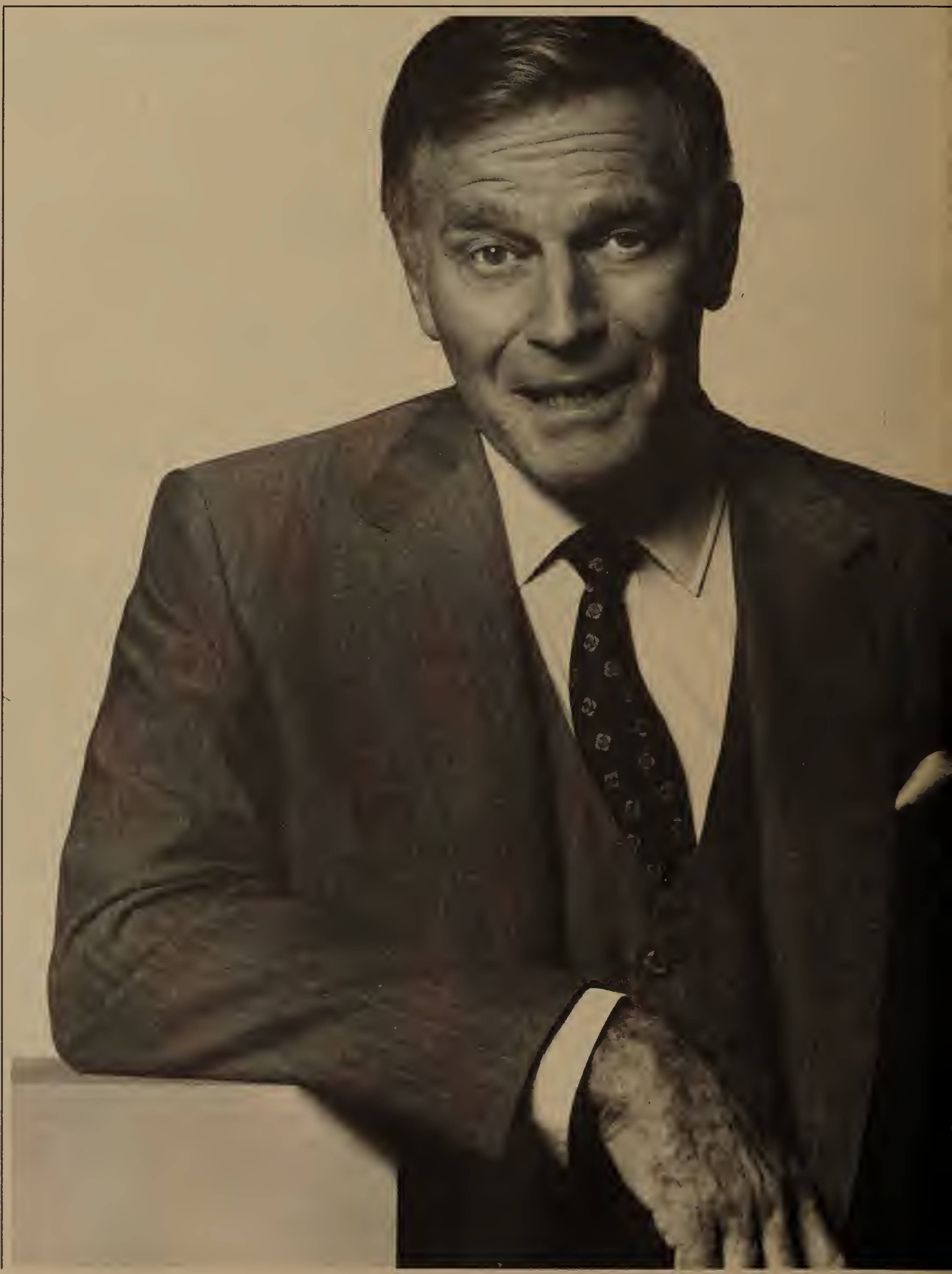
In addition to supporting voice telephone features, the Data telephone's RS-232 port supports connection of a personal computer or terminal. The Data telephone will then transmit data over a voice line to a local printer, a local host computer port or a local-area network of other personal computers or terminals connected to Data Star Hybrid system-supported Data telephones. The Data telephone can also connect to a modem pool attached to the Data Star Hybrid system cabinet that supports transmissions to remote devices.

The 15-line telephones each have a row of 10 programmable function keys. Up to eight of the line keys can be configured as function keys, giving the telephone 18 programmable function keys and seven central office lines.

With optional call distribution, users can configure up to 16 Executive Display telephones to monitor the activity of call-handling work groups and view the current status of all workers in the group. The display function lets managers configure the call distribution feature from the telephone set.

The optional least-cost routing configuration can be altered on-site or from remote sites. It also features a self-test to ensure the least-cost routing scheme is in operation. Another cost control option allows system administrators to assign each user with one of up to 800 account code numbers.

Tie will distribute the product through Bell operating companies and telephone interconnect distributors. Pricing ranges from $10,000 to $60,000.



▶ RESOURCE SHARING

Processor, software link Sperry line

BLUE BELL, Pa. — An entry-level 52-line front-end processor and communications software were buried in a myriad of processors unveiled by Sperry Corp.

Sperry announced the products with its 2200/200 series of midrange systems. The four-model 2200/200 series is based on Sperry's proprietary microprocessors. The models range in size from 4M bytes to 48M bytes of memory and in power from 1.2 million to 4.2 million instructions per second.

The announcements were seen as an attempt to assure current users that the firm's product line will be sustained and expanded following Burroughs Corp.'s takeover of Sperry, industry analysts said.

The firm expanded its distributed communications processor product line with the addition of the 52-line DCP/15. The device fits into Sperry's existing Distributed Communications Architecture (DCA) and can be used as either a front-end processor or a remote network processor and concentrator. Sperry's DCP front-end processor line includes models supporting 1,016 lines, 184 lines, 52 lines and 28 lines.

The $13,750 DCP/15 supports synchronous and asynchronous transmissions, processes up to 14 transactions per second, comes with 2M bytes of local storage and has an operating speed range of 75K bit/sec to 250K bit/sec. It is designed to fit into a 19-inch rack and has a 5¼-inch floppy disk drive and a 20M-byte hard disk. The unit will be available in early 1987.

The device will run DCP operating system software that provides users with memory management, file control and service utilities. Supplied with Sperry's Telcon package, the DCP operating system will also run networking and gateway packages as independent applications.

The firm's Distributed Systems Services (DSS) software provides library and document distribution services and enables Sperry's line of computers and MS-DOS-compatible personal computers to exchange documents and share processing power. DSS represents the first phase in providing a Sperry-to-IBM Disoss link. Supporting IBM's Document Interchange Architecture (DIA), a copy of DSS must run on each Sperry system wishing to interchange information.

The package supports distributed data processing through program-to-program communications. Using Sperry's DCA, the package also features file transfers between systems, job scheduling, remote initiation of transaction processing and electronic mail.

The software also converts Unix and MS-DOS files to and from the Sperry series 1100's System Data Format and allows documents generated on smaller Sperry systems to be stored in a Series 1100 mainframe host library.

Sperry announced last spring that it intends to bridge its DSS package to IBM's Disoss over an IBM LU 6.2 Advanced Program-to-Program Communications interface. Other versions being developed will support IBM's Systems Network Architecture and DCA.

DSS pricing starts at $850 for a personal computer version and reaches $42,750 for a version running on Series 1100 mainframes.

"Recently, Contel installed a network that could have been the 21st largest phone company in the country.
"Instead it was *the* biggest private network. For a big community called McDonnell Douglas."

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Products & Services

T-1 transcoder

Granger Associates has announced a transcoder that enables T-1 multiplexers to use adaptive differential pulse code modulation (ADPCM).

ADPCM typically enables an end user to double the number of channels on an existing T-1 line. Granger said that its product, TC7900-M1A Transcoder, will work with any company's T-1 multiplexer.

The transcoder complies with standards developed by the Exchange Carrier Standards Association. The product supports transmission by frequency shift keying modems, including those that comply with Bell 202 standards.

The transcoder includes 19-inch or 23-inch shelves, partial or complete rack assembly and portable self-powered cabinets for emergency restoral.

The devices cost approximately $155 per channel.

Granger Associates, 3101 Scott Blvd., Santa Clara, Calif. 95054 (408) 982-3101.

Opinions

PRODUCT PREANNOUNCEMENTS

JEFFREY ROTHFEDER

Bank not on vendor promises

Now that summer's over, users can expect vendors to kick off their fall ritual of announcing new communications equipment, software and services. Their announcements, full of bravado and self-praise, will attempt to ensnare and embrace at the same time.

The products and services will range from simple to complex and from well-designed to woefully inadequate.

But many of them will have one characteristic in common: They will not be available for purchase for at least a year; that is, if they become available at all.

Examples of the rush to make announcements are legion among smaller vendors. Flashy headlines and press coverage by trade magazines for products that are not even off the drawing boards bring free publicity and name recognition to less wealthy manufacturers. Often, these vendors hope to capitalize on this publicity to open up venture capital spigots.

What is even less understandable, though, is when companies such as AT&T, IBM and Northern Telecom, Inc. risk their reputations and the confidence of their customers by announcing products far ahead of release dates. Yet this occurs frequently.

For example, AT&T's Starlan network was announced in 1984. It finally became available late in 1985. Enhancements were announced at that time. However, these enhancements are only now beginning to trickle out of the company.

IBM's Netview, which allows the use of a Personal Computer as a dumb terminal for the management of nondata networks on an IBM mainframe, was announced a couple of months ago. Unfortunately, the best guess is that customers will have to wait until late 1987 to purchase Netview.

Also, Northern Telecom announced the Meridian Integrated Media Messaging System, a voice/data network, in February 1985. But guess what? This product won't be ready until at least the end of 1987.

Michael Schumer, a vice-president at Gartner Group, Inc. in Stamford, Conn., argues that there is nothing wrong with this type of vendor behavior.

"If IBM announced a product today that is ready today, it wouldn't sell a single one," he says.

According to Schumer, many companies announce products early in order to give purchasing companies time to alter their physical plants and train their staffs for the new equipment.

"Most communications products can't simply be snapped into place," Schumer notes. Moreover, early announcements encourage third-party vendors to support the new offerings and in the process lend credibility to the promised product.

Although these reasons may make good business sense to vendors, they offer little solace to the communications manager who has to juggle scheduling, budgeting and corporate needs while he waits a year or more for the new products to arrive.

Indeed, vendors have made communications managers wait so long over the years that many managers have become skeptics, claiming that all early announcements of products are nothing more than trial balloons and attempts to stifle competition.

"Time and time again, I've seen large vendors literally wrap up a market just by announcing a product before they've even built it," says Robert Hong, a communications manager at Grumman Corp. in Long Island, N.Y.

"Suddenly, a communications manager who is in the process of purchasing a similar product from a smaller company is under a huge amount of pressure from his superiors and his own sense of caution to wait and see what the big firm comes out with."

According to Duff Mich, a Pasadena, Calif., telecommunications consultant, the communications manager has some recourse.

"[He's got to] fight back the only way he knows how — economically," he says.

"He's got to hit the vendor where it hurts. Don't buy a vendor's product if it has a history of delaying or sending up trial balloons."

According to Mich, communications managers should be more secure in their conviction that their decision to ignore a vendor — even a major one — who has not treated them right in the past, is the right move.

Also, he says, communications managers should draw up purchasing contracts with strict timetables that require the vendor to pay a penalty in the form of cash, product or service for missed target dates.

"If the buyer hits back and becomes less passive," Mich adds, "the vendor's attitude will change for the better." However, such changes in attitude probably won't occur until the market matures.

Rothfeder is a free-lance writer based in Wyckoff, N.J.

SMALL BUSINESS SOLUTIONS

MARK WINTHER

Small users: Think big

Today's most innovative telecommunications systems are typically designed to meet the complex requirements of large businesses. Small business needs are rarely either addressed or aided by the winds of change sweeping through the communications industry. Yet small businesses represent, by far, the largest group of users, and their productivity and growth exceed that of large businesses.

Two factors are impeding small business use of innovative telecommunications services. First, small businesses appear to lack knowledge of their current telecommunications needs as well as plans for telecommunications services and equipment.

Second, the great diversity of small businesses has traditionally made their telecommunications and information needs difficult for vendors to define. As a result, these users have had trouble getting the services and equipment they need because vendors haven't been as responsive to smaller niches in the market.

Defined by the Small Business Administration as independently owned and operated businesses with less than 500 employees and annual revenue under $10 million, small businesses account for nearly 14 million, or 97%, of all U.S. businesses. Moreover, businesses with less than 500 employees produce 2.5 times the product innovations of large companies, and small business employment growth from 1982 to 1984 was 11.4% compared to 5.3% for large businesses. AT&T Communications, Inc. says that 90% of its business customer base and 40% of its revenues come from small business customers.

To understand the telecommunications needs of small businesses, Link Resources Corp. conducted a nationwide telephone survey of 748 small businesses randomly drawn from a Dun & Bradstreet Corp. Marketing Services's data base of 5.5 million firms.

The survey shows that while small businesses tend to be highly computerized, their use of innovative telecommunications technologies, such as voice messaging, online data bases and electronic mail, is very low.

Small businesses are significant consumers of basic telecommunications and computer technologies. More than 70% spend over $100 per month on telephone service, and nearly 40% are equipped with at least one personal computer.

In a list of office and communications equipment, this ranks third after photocopiers and key systems. Modems rank fifth overall, at almost 17% penetration, but in small businesses with personal computers, 33% own modems. Nearly 12% respond that they use cellular telephones and another 15% use paging services. The local telephone company remains the primary source of telecommunications equipment for small businesses — 58% get their telephones from the local telephone company.

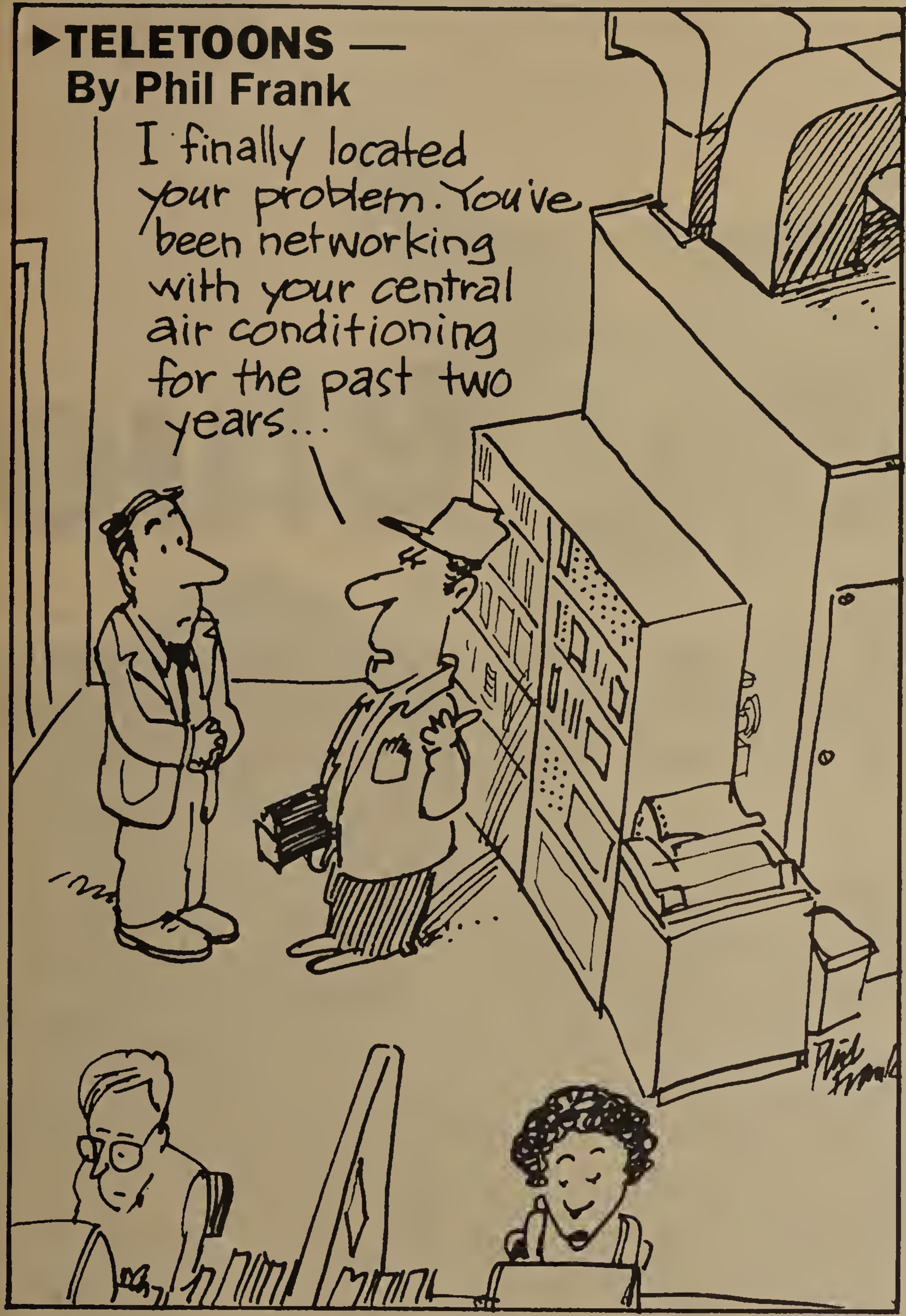
Glaring proof of the small business user's ignorance of his communications needs is that 17% of survey respondents either did not know the amount of their monthly phone bill or did not have it available. The "don't know" response was substantial throughout the survey. When asked about future purchasing intentions regarding telecommunications and office automation equipment, nearly 90% of the respondents said they don't know what they intend to purchase. This is not because small businesses are badly managed, but because they do not have a specialized support staff to monitor and administer telecommunications activities.

The small business person is concerned with the ongoing day-to-day operations of business, which typically means problems of insuffi-

Winther is director of New Communication Services at Link Resources Corp. in New York.

Opinions

▶TELETOONS —
By Phil Frank


I finally located your problem. You've been networking with your central air conditioning for the past two years...

cient time, money, people, space and other resources. No time is available to deal with improving communications and computing practices, and frequently no one is available to turn to for advice or information. Decisions on what to acquire and on long-term planning are often either the domain of an ambitious administrator or one of the 101 tasks of an overworked office manager.

Despite their small size and often modest requirements, small businesses can have relatively complex telecommunications needs, and it can require a good deal of investigation to arrive at an optimal solution. Yet too often these users simply take stock solutions offered by the local telephone company. This is unfortunate because investigating a small business' telecommunications needs and alternatives can result in substantial savings.

Small businesses tend to be highly computerized. Computer applications tend to be stand-alone with spreadsheet/financial analysis in the lead. Their use of facsimile machines (7%), telex (7%) and modems (17%) indicates that about a third of small businesses already have the capability to send and receive information electronically. In addition, 42% of small businesses say they use express courier services such as Federal Express. This indicates that small businesses clearly have a need for electronic communications services.

However, small businesses are a long way from utilizing such enhanced services as electronic mail (3%), voice messaging (1%) and online data bases (1%). Not only do small businesses not use these services, but a significant proportion have never heard of them: More than 20% of respondents say they never heard of electronic mail and information data bases, and 34% never heard of voice messaging.

Most telecommunications users have only basic service and equipment. They have the ability to make and answer calls, one or two telephone handsets and perhaps an answering machine. Some small businesses may require telex terminals or a wide-area paging service.

Other alternatives, such as a voice messaging system, could help

See **Users** page 41

LOCAL-AREA NETS

MICHAEL DURR

Landmarks in local net benchmarks

The local-area network benchmark wars are heating up again. Statistics spew forth like numbers on lottery tickets. Every local net company and every communications magazine seems to have its own perennial performance statistics. As usual, there's wide variation in the tests, results and analyses.

Given the general dearth of performance measurement tools, this interest in local net benchmarking is understandable. Because of the complexity of local net performance testing and the lack of a universal rating scheme, benchmarks are the only measurable means of predicting local net performance.

Interest in benchmarks is increasing as the local net industry matures. Local net standards, especially in the areas of application interfaces and data integrity, have been a major turning point in local net acceptance. They've encouraged application developers to write multiuser applications for local nets and convinced major end users that local net technology is workable.

But the standards have also changed the way that local nets are evaluated. Compatibility and data integrity — once the primary evaluation criteria — are no longer issues because the standards have defined them. If a local net supports the accepted software interfaces, it is "standard compatible." If it supports the standard file server that everyone uses, it has good data integrity. Most well-known local nets support these standards.

At the high end, the differences between local nets can be determined by comparing their implementation of security, internetwork and wide-area network connectivity and fault tolerance. However, the basic local net functions such as multiuser locking and peripheral sharing are now standardized — partially through product maturity and the industrywide availability of third-party applications.

In this standardized environment, ease of use, performance and price are the only general evaluation criteria that separate one local net from another. This simplified situation makes choosing local nets much easier for end users. At the same time, it forces each local net vendor to demonstrate superiority in one or more of these three areas. One of the results is heightened interest in the performance of local nets.

Performance has been a controversial issue in networking. Some local net companies have stated that speed, fast speed and ultrafast speed are irrelevant; as long as data is delivered to end users within a reasonable threshold, that's fast enough.

In network planning, however, one user's needs are not the only parameter. The other important consideration is the number of workstations that are supported. A higher performance network can deliver acceptable performance to a larger number of users, thereby lowering overall system cost.

It can also handle demanding accounting or graphics applications that might be beyond the capability of a slower net serving as few as two or three users.

So, performance is an important factor in system expansion, capability and cost. And benchmarks are the best means of comparing local net performance. This brings up that fundamental problem mentioned at the outset: Among benchmarks, there's wide variation in the tests, results and analyses.

The key to evaluating benchmarks is the published methodology. What aspect of networking did the tests examine, and how were the tests designed? In test design, users can either measure the maximum throughput for specific operations or measure throughput in a mixed-application environment. Both tests allow users to compare performance among different local nets, but only the measurement of specific operations offers the means of anticipating actual performance.

Although the mixed-application environment attempts to replicate normal network conditions — some word processing, some data base work and so on — this kind of test introduces too many variables. Every net-

See **Benchmarks** page 41

Durr is public relations manager for Novell, Inc. in Orem, Utah.

NETWORK WORLD

Features

October 20, 1986

Big Blue keeps a close eye on open architecture
With the announcement of its open communications architecture, IBM is doing a strategic about-face toward its competitors. Big Blue is allowing vendors to work with its products. But IBM has made it clear that anyone who wants to play in its ballpark must play by IBM's rules.
Page one.

Should they build one for you?
IBM's endorsement of baseband local nets through the introduction of the Token-Ring Network has lent credence to arguments that baseband is the local net wave of the future. But in any case, telecommunications managers should know the baseband technology basics, as well as who the players are in this expanding market.
Page 35.

▶ IBM COMMUNICATIONS

Big Blue keeps a close ey on open architec

Continued from page 1

of publishing and making accessible the interfaces to those architectures." It appears that IBM no longer wishes to be a big blue cloud overwhelming other vendors' attempts to stay competitive, let alone profitable, in the communications marketplace.

Instead, IBM wants to be perceived as a gentle giant, carefully nurturing and supporting vendors, software programmers and end users to provide an open communications environment that will be healthy and profitable for all concerned. The reality falls somewhere in between.

It is true that IBM has made strides in allowing vendors to work with its processors, software and communications products. Since the introduction of the PC Network, IBM has published information that enables third-party vendors to write applications for its local-area network products — an option also available in Systems Network Architecture under LU 2 and LU 6.2 protocols. These methods allow software vendors to provide some of the pieces, particularly in applications software, that IBM does not provide.

But it is unlikely that IBM will open its communications environment to the generic, de facto industry standards that other network and communications vendors are forced to consider in product development. The key in understanding IBM's open communications architectures is to understand IBM's definition of "open."

To most of the industry, an open product is an industry standard. It is a generally recognized product like Ethernet that many vendors

Fleig is director of systems research at International Technology Group in Los Altos, Calif.

e

ture

support in a similar product. To IBM, "open" means the opportunity for other vendors to work with an IBM product in the way that IBM specifies. It is an opportunity to play in IBM's ballpark, as long as the vendor plays by IBM's rules.

In IBM's open communications architectures, the "rules" are a set of programmer interfaces that enable IBM to control its communications environment while allowing other vendors to develop products that IBM's users need. IBM's history of providing mainframe and minicomputer software development tools form the basis of IBM's communications plans. The programmer interfaces will allow IBM to leverage its domination of the computer marketplace into a domination of the communications marketplace.

IBM's overall data communications strategy can be segmented into the four following areas:

- SNA, which was devised to handle communications between the mainframe and terminals.
- Local-area networks, which primarily comprise the Token-Ring and the PC Network.
- Micro-to-mainframe links.
- Network management, which is centered on the 6-month-old Netview product.

IBM's decision to open its communications architectures illustrates the curious predicament IBM has been in since the initial success of the Personal Computer. When the Personal Computer was introduced, it was the first genuinely open architecture that IBM supported. Since then, IBM has been looking for ways to close it because Big Blue's long-term strategy has always been dependent on host control of all processors.

With the multimillion-dollar market that the Personal Computer has spawned in the last five years, few people realize what an anomaly the product was for IBM. On the one hand, the Personal Computer enabled IBM to control a whole new computer hardware segment. On the other hand, it populated the world with generic Ascii boxes that did not fit into the rest of IBM's proprietary product line.

Short of introducing a proprietary workstation — a move it may make by late 1987 — IBM is forcing Personal Computer software developers to follow the same interface "rules" that mainframe and mid-range software developers have been playing by for years. IBM's move to open its communications architectures is a disguised move to close its Personal Computer architecture.

But that plan is just a subset of IBM's long-term communications goals, which hinge on providing a universal communications interface for users. Once a universal interface is in place, users will eventually be allowed to access data on

☞ Continued on **page 34**

From **page 33**

any processor in their companies' IBM communications system, as well as manipulate the data at a personal workstation and send or store it elsewhere in the system.

Communications will take place transparently for the user, whether the network is made up of a department, office building, campus or multinational corporation.

Given the current incompatibilities of IBM's processors and the state of its communications, the reality of a universal communications interface is several years away. But IBM is laying the groundwork today.

IBM's recent crop of programmer interfaces illustrates how the company is progressively building toward its universal communications interface.

These four interfaces give software programmers the tools to create applications for IBM's communications products and an understanding of the company's direction. By providing the interfaces now, IBM is able to decrease the time lag between the availability of its communications products and applications for those products.

> *“IBM's recent crop of programmer interfaces illustrates how the company is building toward its universal interface.”*

APPC: the distributed processing solution

For IBM's long-term communications strategy, the most important of the interfaces is Advanced Program-to-Program Communications (APPC).

APPC, functioning under SNA as the LU 6.2 and PU 2.1 protocols, is IBM's communications solution to the distributed processing problem. It allows two processors to transfer files on a peer-to-peer basis instead of having one processor handling the host functions while the other is subservient to that host.

IBM has been adding APPC functions to its mainframe and mid-range processors for several years, and it contributed even more with its announcement of APPC/PC in October 1985. IBM was making people aware of the prominence of APPC.

One year later, IBM added APPC support to yet another mainframe operating system — the VM/ST.

The APPC interface is now supported by all of IBM's mainframe, mid-range and Personal Computer processors. It is the foundation for moving SNA from a static communications environment that can handle only terminal-to-mainframe connections to a dynamic network environment that can support several communications levels.

With APPC, IBM is sending a clear and consistent message to software developers that applications written for IBM's network environment must support APPC.

Applications written as stand-alone packages or without the APPC interface are likely to dwindle as software written to APPC becomes available over the next 18 to 24 months.

At present, however, APPC is supported in the mainframe environment under CICS only, with Disoss as its central application.

Despite the delay in development, IBM has indicated through its statements of directions that APPC is the umbrella interface under which all of IBM's communications interfaces will be drawn. It is the key step toward IBM's long-promised universal user interface.

Server-requester programming interface (SRPI)

SRPI was introduced in May as part of IBM's micro-to-mainframe link application called Enhanced Connectivity Facilities (ECF).

The purpose of ECF is to provide users with a transparent microcomputer-to-host connection that allows them to share mainframe functions, including virtual print capability, and host data base access, without knowing host file formats or even the host's location.

SRPI provides the interface that allows developers to write software that supports the ECF links.

Although IBM states it will support SRPI under APPC in the future, SRPI is designed to support the LU 2 3270-emulation environment right now.

By supporting this environment initially, IBM is giving developers and users the opportunity to “get ready” for APPC by migrating the large installed base of 3270 applications to SRPI.

In its present form, SRPI supports three virtual files — print, file and disk — as well as a file transfer command and host data base access.

With the virtual disk and print commands, users can use the mainframe storage and printer in place of those specifically for the Personal Computer.

The virtual file command, by contrast, lets the Personal Computer user access host files transparently. Host data base access supports DB2 and SQL/DS data bases, allowing Personal Computer users to build SQL language queries.

The file transfer capability is perhaps the most valuable to the current generation of Personal Computer users. It allows data to be copied between Personal Computer files, host files and virtual files. Supported file transfer formats include: Data Interchange Format, Lotus Development Corp.'s Symphony and 1-2-3 formats, and Ashton-Tate Dbase II and III formats.

Again, the message from IBM is evident. The time when users could throw an Irma card into a Personal Computer and get a micro-to-mainframe connection is ending. If developers want their software to make use of ECF links, they will be forced to do things IBM's way. IBM's strategy certainly is not to cut out developers that can provide useful applications to IBM's users, but to make sure that development is controlled.

As with APPC, there is a time lag between the introduction of the interface and the availability of the products. The full complement of ECF products will not be available until September 1987, giving developers the time to create new applications and recompile older applications to work with the link.

Netbios — The oldest of the interfaces

Network Basis I/O System (Netbios), released in August 1984 in conjunction with the original Personal Computer Network introduction, is the oldest of IBM's Personal Computer communications interfaces. It functions as the interface between the network adaptor and the operating system or local-area network application.

Netbios distinguishes itself from other local-area network interfaces by its presence between the session and presentation layers of the Open Systems Interconnect model. By contrast, most other local-area network interfaces exist between the link and network layers.

IBM provided Netbios to stimulate third-party developers to write applications for the PC Network with assurance from IBM that when the Token-Ring was released, it would support the same interface.

That, of course, has proved to be accurate. However, because of development delays, it took nearly 18 months for a wide variety of Netbios-based applications to become available for IBM local-area networks.

> *“IBM is sending a message to software developers that applications written for IBM's net must support APPC.”*

From the standpoint of IBM's long-term communications strategy, Netbios is an enigma. It was designed as the programmer's interface specifically for IBM's local-area networks. As such, it does not fit under the SNA/APPC umbrella.

IBM handles this incompatibility by providing concurrent support for both Netbios and APPC/PC only on the Token-Ring. Dual support is not offered for the PC Network.

Application Programmers Interface (API), the latest in IBM's series of Personal Computer-based interfaces, is provided for Netview/PC, IBM's network management package.

As with the other interfaces, it allows third-party developers to write software so non-IBM devices can be managed from Netview resident on a mainframe host. IBM has not yet released the specifications for this interface.

Like APPC, this interface is crucial to IBM's network strategy because it provides the route by which non-IBM devices, such as an AT&T private branch exchange, can be managed by SNA. With Netview/PC and API, IBM's SNA umbrella not only covers all of its own processors and switching equipment but also those of its competitors.

Because of the immense PBX base, IBM is giving users a way to get voice and data communications from a central mainframe host. This is one of the few times that IBM has supported another vendor's product via diagnostic help.

Toward a universal interface

Each of IBM's four key communications interfaces — APPC, Netbios, SRPI and API — will be weaved together to create a universal communications interface.

Ultimately, this is IBM's best strategy for tying together all its incompatible architectures and operating systems. APPC is by no means the only step toward this interface.

Another clue to IBM's communications strategy is the Integrated System Programming Facility (ISPF), which consists of extended dialog management services with a menu-driven interface to most major IBM system software products. It operates under all of IBM's major operating environments.

Currently, this interface is targeted at in-house systems programmers for applications development and at some engineering and scientific market niches.

However, IBM has stated its intent to extend the features of ISPF to commercial markets.

Although ISPF is not slated to become part of IBM's universal interface, it is clearly in keeping with the approach IBM will use because it provides a single route into an IBM system.

IBM's Hancock promised users in her statement that both the IBM Personal Computer and IBM communications architectures will remain open, and it is a promise that IBM will probably keep. But only on its own terms.

Should they build one for you?

IBM's Token-Ring turns heads toward baseband nets.

BY JOHN J. HUNTER
Contributing Writer

When IBM canceled its agreement with Sytek, Inc. for Personal Computer local-area network cards, communications industry gurus read this as IBM's endorsement of baseband as the local-area network technique of the future.

Whether or not this proves to be true, there are more baseband products available right now than broadband offerings, and more baseband applications are on the way.

The baseband local-area network, like its broadband brother, allows user stations to communicate without a central controller. Like broadband, the baseband local-area network uses a single backbone cable to transmit information at data rates from just less than 1M to 10M bit/sec.

Where broadband uses CATV cable and frequency-division multiplexing to divide the bandwidth into channels that are assigned to specific applications, classes of applications or users, baseband commits the entire bandwidth to an individual station when local network access is granted.

The station can be any user device including a terminal, personal computer, printer or minicomputer, depending on the individual local net vendor's level of support. The three basic types of baseband local-area network configurations are token ring, token bus and Ethernet (see story page 36).

Baseband applications

Baseband local-area networks are well suited for general office applications, for example word processing, electronic mail and local processing), computer-aided engineering (CAE) and factory automation. Ethernet-based local-area networks are popular with CAE users because of their high speed and the availability of good networking software.

Factory automation is another popular baseband local-area network application, and those systems using token passing are favored because terminal access is predictable and deterministic. The local networks in this survey, except those specifically intended to connect personal computers to the backbone, support a wide variety of asynchronous and synchronous stations.

Asynchronous devices operate in burst mode, unless the inefficient echoplex operation is required, so they have the lowest functionality and performance. Also, their speed is limited to 19.2K bit/sec. Synchronous stations are somewhat better because they use bit- and byte-oriented protocols and operate at speeds up to 56K bit/sec.

IBM 3270 terminals are even better because they transmit data at about 2.4M bit/sec. To diminish the inefficiency of Ascii terminals, many local networks employ protocol converters in the cable interface unit (CIU) — also called a controller — to make Ascii devices appear to be synchronous or Synchronous Data Link Control terminals.

Cable choices

Baseband local networks usually employ coaxial cable as the backbone medium, although some vendors use twisted-pair wires or fiber-optic cable (See chart on page 38). The Federal Communications Commission has also recently approved the use of radio techniques to implement wireless local networks. The advantage of twisted-pair wires is that they are relatively inexpensive to buy and easy to pull within buildings. Also, existing twisted-pair telephone wiring can be used.

Twisted-pair wires, however, do not have the data-carrying capacity of coaxial cable, and existing in-house telephone wires may not be suitable for local net operation due to variations in wire quality and the susceptibility of unshielded wires to electrical interference.

Fiber-optic cable, on the other hand, accommodates data in the gigabit range and is relatively easy to pull.

However, fiber-optic cable is expensive, and the use of passive fiber-optic taps can attenuate the signal each time the fiber is split to attach a new station or establish a new network branch. This limits the distance over which fiber-optic networks can be used. Fiber-optic lines also propagate phase jitter, which adversely affects the transmission signal.

However, new active fiber-optic taps will regenerate the optical signal and should reduce phase jitter. Fiber-optic lines are increasingly used in manufacturing environments where a high degree of electromagnetic force is involved, because fiber cable is not susceptible to electromagnetic interference.

Products such as AT&T's Starlan implement Ethernet on conventional twisted-pair telephone wires. However, instead of transmitting at the Ethernet standard of 10M bit/sec, Starlan transmits at 1M bit/sec.

Other vendors using twisted-pair wiring are AST Research, Inc.,

☞ Continued on **page 37**

Hunter is president of TMS Corp. in Devon, Pa.

▶ BASEBAND LAN TYPES

Three's a crowd in IEEE specs

Baseband local-area networks fall into three categories described by specifications of the Institute of Electrical and Electronics Engineers. They include IEEE 802.4 (token bus), 802.5 (token ring) and 802.3 (Ethernet). The token ring is gaining in popularity mainly because it is used by IBM's Token-Ring Network.

In token-passing networks, a token is generated when the network is initialized. It continues to circulate as long as the network operates. Each user regenerates the token before passing it to the next station. Should a token be lost due to a system failure, established procedures are used to recover it.

Token bus local-area networks employ a backbone coaxial bus cable with unconnected ends. The token is passed from station to station unless a priority scheme is used that passes the token more frequently to specific terminals.

The length of token bus networks varies, depending on the vendor and the type of coaxial cable used. The popular RG59/U cable is used in networks across distances as great as 4,000 feet. Also popular is the RG11/U cable, which is used in networks up to 7,000 feet .

The token-ring local-area network configuration consists of a physical or logical closed loop made up of a series of point-to-point paths. Each ring tap breaks the cable and receives data from the next higher station on the network. To prevent total system interruption in the event of station failure, physical ring networks are usually wired with a dual cable that can bypass a failed unit.

Another token-ring network design employs a star topology with the terminals connected to a central site, usually a wiring closet, where the members of the ring are linked together in a logical ring. The advantage of a star network is that a failed station node is easily bypassed. However, if a major failure occurs in the wiring closet, the entire network is affected. IBM's Token-Ring and AT&T's Starlan networks use a star topology.

The most popular wiring employed for token-ring local-area networks is data-grade shielded and the unshielded wiring employed by inside telephone lines. Network length varies from 2,000 to 7,000 feet, depending on data transmission speed and wire type.

Also, bridges are available for linking ring local-area nets together.

The IBM Token-Ring operates over a variety of transport media, the most common being the IBM Type 2 wiring plan. This plan consists of a cable that contains two twisted-pair wires for data and four twisted-pair wires for voice IBM has also announced support for Type 3 and Type 5 wiring, which consist of twisted-pair wiring used in conventional inside telephone wiring, and fiber-optic cable, respectively.

The IBM Token-Ring employs a star configuration with all stations terminating in a wire closet. Station connection is via logical ring. As many as 260 Model 8228 workstations can be accommodated at a distance of 200 meters between stations and at distances as great as 750 meters if an IBM Model 8218 Copper Repeater is used to link wire closets.

For Type 5 wiring, IBM's Model 8219-1 repeater extends the distance between workstations to 2000 meters. If Type 3 wiring is used, the maximum number of workstations supported is 72 and the maximum distance between the workstation and wiring closet is 100 meters. However, the 8218 cannot be used to link this type of wiring closet.

IBM's Token-Ring access method supports eight service priorities, which can be oriented toward specific types of traffic or exceptional situations. For example, various priorities can be designated as asynchronous interactive or synchronous real-time. Other token vendors also offer priority service.

The Ethernet local net specification calls for a coaxial cable backbone medium with a data-carrying capacity of 10M bit/sec. The network is divided into three cable segments of 500 meters (about 1,666 feet), and cable segments are joined via active repeaters.

What does
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The maximum length of an Ethernet network is 2.5K meters (about 8,333 feet). This includes the backbone cable length, and the length of the cables that connect the stations to the backbone medium.

The fact that Ethernet local-area nets are restricted to three segments is primarily due to the propagation delay of 9.6 microsec associated with moving a data packet from one end of the cable to the other, and the influence the delay has on packet collisions that occur when stations enter data packets into the network.

The Ethernet 802.3 specification allows up to 100 station transceivers to be placed on a cable segment, and stations must be at least 2.5 meters apart to reduce the interference caused by standing waves. The specified maximum number of stations on an Ethernet network is 1,024, but some network designs circumvent this limit by employing active repeaters to regenerate transmitted signals.

Users wishing to extend the network beyond the three-segment Ethernet limit must configure separate networks and link them through the use of a buffered repeater or filter bridge.

Both the buffered repeater and filter bridge monitor the message packets traversing the local net backbone, looking for packets addressed to the other portion of the network.

Upon detecting one, the buffered repeater/filter bridge stores the packet in its buffer, acquires control of its segment of the network and transmits the packet into that segment.

Buffered repeaters and filter bridges are also used for load balancing network traffic. For example, during heavy transmission between stations, a buffered repeater or filter bridge can be used to create a subnetwork, freeing the remainder of the network of the high-density traffic.

—John Hunter

From **page 35**

Bridge Communications, Inc., Comdesign, Inc., Contel Business Networks, Corvus Systems, Inc., David Systems, Inc., Fast Feedback Technologies, Fox Research, Inc., IBM, Interlan, Inc., Micom Systems, Inc., Nestar Systems, Inc., Novell, Inc., Proteon, Inc., 3Com Corp. and Tiara Computer Systems.

Astra Communications' Astranet implements a 10M bit/sec Ethernet over the IBM Type 2 wiring plan.

Astranet uses a hierarchical star configuration that consists of concentrators and transceivers; the concentrators are interconnected by fiber-optic cables, and the cable distribution to the stations is through data-grade twisted-pair wiring that meets IBM cabling specifications.

Thinwire is another wiring scheme employed by some vendors as the local-area network backbone. Developed by Digital Equipment Corp., Thinwire is RG58 C/U coaxial cable that interconnects up to 30 devices over as many as 185 meters without repeaters.

Thinwire's throughput is 4M bit/sec. DEC also offers a multiport repeater with nine ports, each of which operates as a repeater and allows connection of eight Thinwire cable segments of up to 185 meters. As many as 29 devices can be connected to each segment, for a maximum of 232 stations per multiport repeater. DEC also offers the LAN 100 Bridge, which serially links up to eight segments and extends the Ethernet product to 100 square miles.

Access Techniques

Baseband local-area networks interface with the backbone cable through a CIU that contains a transceiver for inserting and removing messages, a message address recognition facility and a data encoder/decoder.

The CIU also contains a buffer that temporarily stores incoming packets before sending them to the addressed station device. The movement of data around the network and the ability of connected devices to communicate with each other is controlled by system software. Station devices interface with local-area networks through CIUs, which can attach up to several devices, or through a single-port cable interface card inserted into a personal computer or intelligent workstation. The single-port card contains a transceiver, a packet buffer and all the software required to access the local network.

Some systems listed in the chart show a single port, but that port can be used to connect a minicomputer with multiple stations, for example, Datapoint Corp.'s Arcnet, Excelan, Inc.'s Exos 200 Series and Tiara's Multilink (which is based on Arcnet).

Local-area networks designed specifically for personal computer attachment are offered by AST, Corvus, David, Fast Feedback, IBM, Nestar, Orchid Technology, Inc., Proteon, 3Com, Ungermann-Bass, Inc. and Wang Laboratories, Inc.

Local-area networks control ac-

Continued on **page 38**

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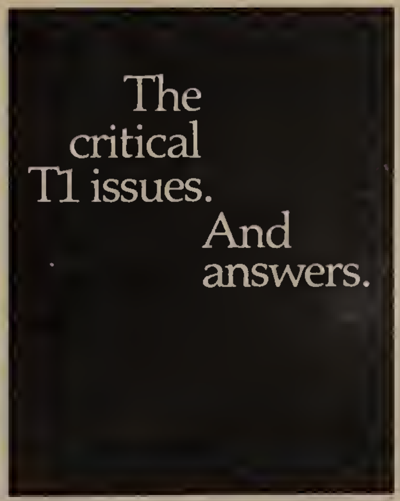


NETWORK
EQUIPMENT TECHNOLOGIES

400 Penobscot Drive, Redwood City, CA 94063, 415-366-4400, TLX 171608
Network Equipment Technologies has applied for a trademark for Network Equipment Technologies.

Vendor	Model	Backbone speed (bit/sec)	Backbone medium	Devices supported per CSU	Stations supported per segment	Maximum number of stations supported	Maximum packet size (bytes)	Access method	Buffered repeater/ filter bridge	Priority messaging	Resource logical addressing	Multicast addressing	TCP/IP support	Gateways	Servers	Lowest cost/port
Applitek Corp. Wakefield, Mass.	NI/OT	10M	Coax	32	1,000	3,000	4K	Token bus		✓	✓	✓		X.25 and SNA	Terminal	$450
	EI 10	10M	Coax	10	100	1,024	1,526	CSMA/CD	✓	✓	✓	✓		X.25	None	$325
AST Research, Inc. Irvine, Calif.	PC Net II	800K	Twisted-pair	1	Not app.	64	1,526	CSMA/CA			✓	✓		SNA	None	$500
AT&T Information Systems Holmdel, N.J.	Starlan	1M	Twisted-pair	1	Not app.	1,000	1,526	CSMA/CD	✓		✓	✓		SNA, ISN	File, printer	$720
Bridge Communications, Inc. Mountain View, Calif.	Ethernet	10M	Coax, twisted pair, fiber optic	64	100	1,024	1,526	CSMA/CD	✓		✓	✓	✓	X.25, SNA, token-ring, Unibus	Communications	$250
	CS-1 Token Ring	4M	IBM	64	Not app.	260	2K	Token ring	✓		✓	✓	✓	X.25, Ethernet	Communications	$250
Codenoll Technology Corp. Yonkers, N.Y.	Codenet	125M	Fiber optic	64	Not app.	900	1,526	CSMA/CD	✓	✓			✓	None offered; third-party available	Third-party	$600
Codex Corp. Mansfield, Mass.	Async. LAN	10M	Coax	4	100	4,000	1,526	CSMA/CD			✓			SNA, X.25	None	$400
ComDesign, Inc. Santa Barbara, Calif.	Futurecom	10M	Coax, twisted pair	32	100	1,024	1,526	CSMA/CD		✓	✓	✓		SNA, 3270, async. PC Net	Communications, file, printer	$225
Communications Machinery, Corp. Santa Barbara, Calif.	ENP	10M	Coax	8	100	1,024	1,526	CSMA/CD		✓		✓	✓	Defense Data Network	Terminal	$1,400 for PC; $3,500 for others
Contel Business Networks Bethesda, Md.	Series 3000	10M	Coax, twisted pair, fiber optic	64	100	1,600	1,526	CSMA/CD	✓		✓	✓	✓	X.25, Ethernet; SNA	Printer, file	$595 for PC; $325 for async. terminal
Corvus Systems, Inc. San Jose, Calif.	Omninet	1M	Twisted-pair	1	Not app.	64	2K	CSMA/CA		✓	✓		✓	X.25, SNA, Ethernet	File, printer	N/A
Datapoint Corp. San Antonio, Texas	Arcnet	2.5M	Coax, IBM, fiber optic	1	Not app.	6,120	256	Token ring			✓		✓	X.25, SNA, X.21, asynchronous hosts, Burroughs Poll/Select	File, printer, communications	$695
David Systems, Inc. Sunnyvale, Calif.	David Network Manager	2M	Twisted pair	1	Not app.	6,000 (RS-232)	1,526	CSMA/CD	✓		✓			X.25	None	$250
Digital Equipment Corp. Maynard, Mass.	Decnet	10M	Coax, twin coax	32	100	1,024	1,526	CSMA/CD	✓		✓	✓	✓	SNA, X.25 asynchronous hosts	Terminal, printer, file	$387
Excelan, Inc. San Jose, Calif.	Exos 200	10M	Coax	1	100	1,024	1,526	CSMA/CD		✓	✓	✓	✓	None	None	$795 for PC connection
Fast Feedback Technologies Rodondo Beach, Calif.	Microlan	3M	Coax, twisted pair, fiber optic	1	Not app.	253	1,526	CSMA/CA/CD			✓	✓		None	None	$225
FiberLAN, Inc. Research Triangle, N.C.	Ethernet	10M	Coax, fiber optic	64	100	1,024	1,526	CSMA/CD	✓		✓	✓	✓	X.25, SNA, token-ring, unibus	Communications	$250
Fox Research, Inc. Dayton, Ohio	10 Net	1M	Twisted pair	1	32	128	1,526	CSMA/CD				✓		SNA	File, printer	$1,995
Gateway Communications, Inc. Irvine, Calif.	G-Net	1.4M	Coax	1	Not app.	255	2,550	CSMA/CA/CD	✓		✓	✓		X.25, SNA, async.	File	$1,495
IBM White Plains, N.Y.	Token Ring	4M	Twisted pair, IBM, fiber optic	1	Not app.	260; 72 with twisted pair	2,000	Token ring	✓	✓	✓	✓		SNA, PC Net, async., LU 6.2	Printer	$695
Micom-Interlan, Inc. Foxboro, Mass.	Ethernet	10M or 1M	Coax, twisted pair	8	100	1,024	1,526	CSMA/CD			✓	✓	✓	None	Terminal, file, printer	$395
Nestar Systems, Inc. Palo Alto, Calif.	Plan 3000	2.5M	Coax, IBM, twisted pair, fiber optic	16	Not app.	255	512K	Token bus		✓	✓	✓		SNA, 3270, asynch., Broadband printer	Communications, File,	$595
	Token Ring	4M	IBM	1	Not app.	260	512K	Token ring	✓	✓	✓	✓		SNA, 3270, async., PC Net	Communications, file, printer	$695
Network Systems Corp. Minneapolis, Minn.	Hyperbus	10M	Coax	8	Not app.	3,200	4K	CSMA/CA		✓	✓		✓	None	Terminal	$270
	Hyperchannel	10M or 50M	Coax	5	Not app.	50	4K	CSMA/CD			✓		✓	None	Terminal	$1,700 for PC $20,000 for IBM Selector Channel
Novell, Inc. Paramus, N.J.	S/Net	10M	Twisted pair	24	Not app.	1,536	512	Polled terminal			✓	✓		SNA, 3270,	File async.	$250
Orchid Technology, Inc. Fremont, Calif.	PCnet	1M	Coax	1	Not app.	255	1,526	CSMA/CD		✓	✓	✓		X.25, SNA	File, printer	$1,095
Proteon, Inc. Natick, Mass.	Pronet 4	4M	Twisted pair	1	Not app.	260	2K	Token ring		✓	✓		✓	Ethernet, DDN	File, printer	$1,200
	Pronet 10	10M	IBM	1	Not app.	255	2K	Token ring		✓	✓		✓	Ethernet, DDN	File, printer	$1,200
	Pronet 80	120M	IBM	1	Not app.	255	2K	Token ring		✓	✓	✓	✓	Ethernet, DDN	File, print	$4,000
3Com Corp. Mountain View, Calif.	Ethernet	10M	Coax	1	100	1,024	1,526	CSMA/CD	✓		✓	✓		Token Ring, Appletalk	File, printer	$870
	Token Ring	4M	Twisted pair, IBM	1	Not app.	260	2K	Token ring	✓	✓	✓	✓	✓	Ethernet, Appletalk	File, printer	$1,418

Vendor	Model	Backbone speed (bit/sec)	Backbone medium	Devices supported per CSU	Stations supported per segment	Maximum number of stations supported	Maximum packet size (bytes)	Access method	Buffered repeater/ filter bridge	Priority messaging	Resource logical addressing	Multicast addressing	TCP/IP support	Gateways	Servers	Lowest cost/port
Tiara Computer Systems, Inc. Mountain View, Calif.	Multilink	2.5M	Coax, twisted pair, fiber optic	1	Not app.	6,120	256	Token ring			✓		✓	X.25, SNA, async., Burroughs Poll/Select X.21	File, printer communications	$325
Ungermann-Bass, Inc. Santa Clara, Calif.	Ethernet	10M	Coax	24	2400	24,000	1,526	CSMA/CD	✓	✓	✓	✓	✓	X.25	File, printer	$375
	Thin Coax	10M	Twin coax	24	30	16,000	1,526	CSMA/CD	✓	✓	✓	✓	✓	X.25	File, printer	$595
	Fiber Optic	10M	Fiber optic	24	2400	24,000	1,526	CSMA/CD	✓	✓	✓	✓	✓	X.25	File, printer	$595
	Token Ring	4M	IBM	8	Not app.	260	600	Token ring	✓	✓	✓	✓	✓	X.25	File, printers	$385
Univation, Inc. Sunnyvale, Calif.	LAN Scape	10M	Coax or thin coax	8	100	1,024	1,526	CSMA/CD	✓		✓	✓	✓	Token ring	File	$1,600
Wang Laboratories, Inc. Lowell, Mass	Local Interconnect	2.5M	Coax	24	Not app.	255	512K	Token bus		✓	✓			SNA	File, printer, communiactions	$600
Xerox Corp. Sunnyvale, Calif.	Ethernet	10M	Coax	8	100	8,192	1,526	CSMA/CD			✓	✓		X.25	File, printer, communications	$500

CA = **Collision avoidance**
CSMA/CD = **Carrier-sense multiple access with collision detection**
CSU = **Channel service unit**
DDN = **Defense Data Network**
IBM = **IBM class 2 wiring scheme**
ISN = **AT&T's Information Systems Network**
N/A = **Not available**
Not app. = **Not applicable**
SNA = **Systems Network Architecture**
TPC/IP = **Transmission Control Protocol/Internet Protocol**

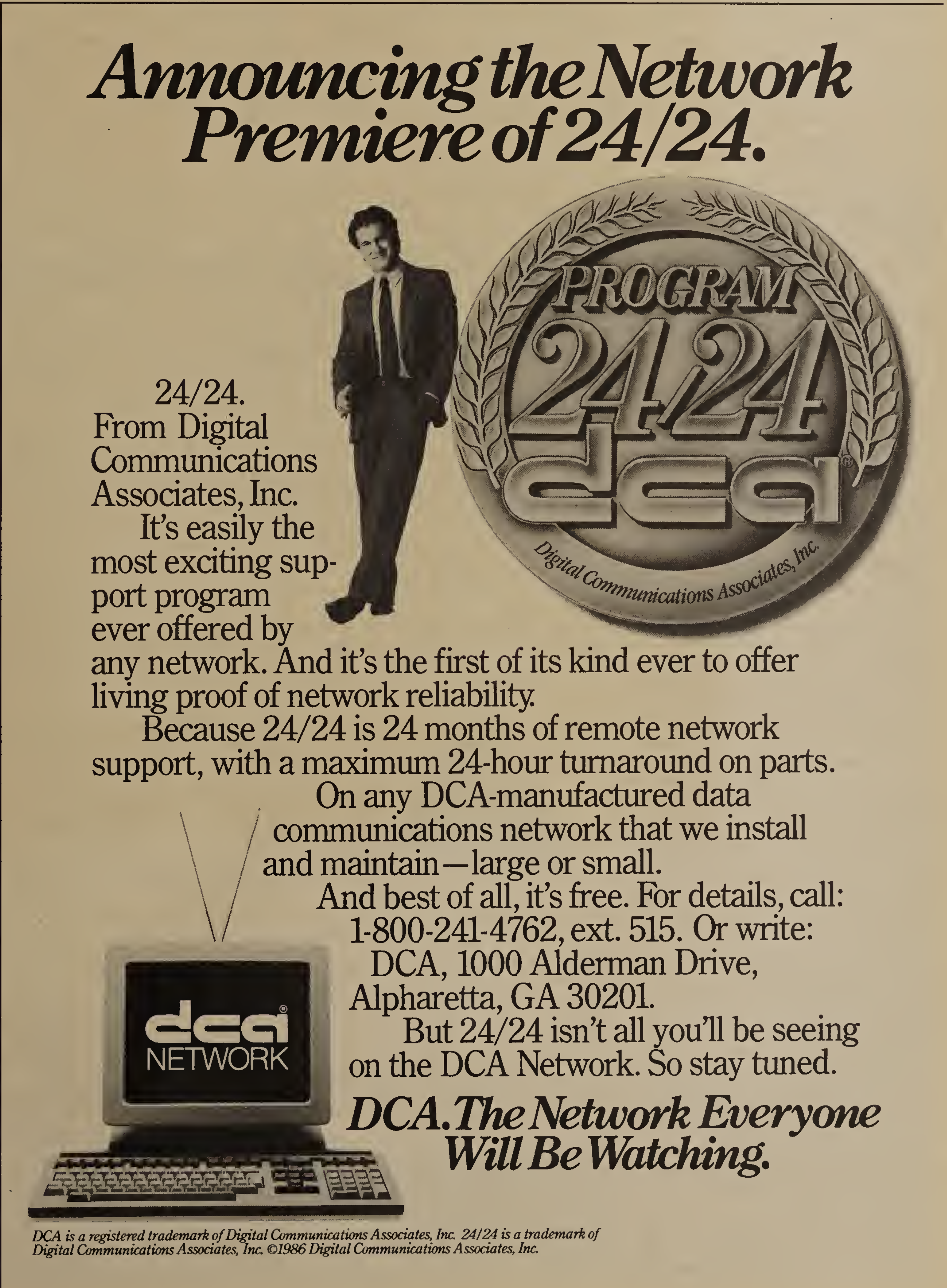
cess to the backbone through contention or token-passing schemes. Token-passing standards have been established by IEEE 802.4 for token bus and 802.5 for token ring. With token passing, each terminal receives a token for a period determined by a timer, inserts information into the data field, regenerates the token and passes it to the next station on the network. In bus systems, this means the next physical station. With token-ring star networks, the next station is the next logical station.

Ethernet uses two types of contention accessing: carrier-sense multiple access/collision avoidance (CSMA/CA) and carrier-sense multiple access/collision detection (CSMA/CD). With a contention protocol, the CIU/station controller listens to the line for transmissions and seizes the communications channel when it senses that the line is free. This technique's biggest weakness is that data packets often collide during simultaneous transmissions and the packet is destroyed. Systems using the CSMA/CA scheme attempt to minimize the chance of collisions through the collision avoidance technique. This strategy calls for the station controller to listen for a time interval and then transmit the data.

Others use the Ethernet-specified 802.3 standard CSMA/CD. When a collision occurs, the station controller calculates an access retry interval and then attempts retransmission. Should collisions occur frequently — which is often the case during heavy traffic periods — the control unit calculates a retransmission delay in order to avoid continued collisions. This is called backoff.

Some local net vendors attempt to invoke a station accessing priority scheme by assigning a value that must be added to the station's calculated retry interval. Thus, a station controller with a lower retry interval will have an effective priority accessing facility. Priority accessing is not part of the Ethernet specification, which calls for equal

Continued on **page 40**



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From **page 39**

access. Local network vendors supporting priority accessing are shown in the chart.

A local-area network's throughput is affected by the size of the packets and the distance between stations; collisions are also a factor. The efficiency of the local network increases when large packets are used and the overhead data bits are reduced.

Ethernet data packets consist of preamble bits, source and destination addresses, a field type identifier, data and cyclic redundancy check bits. The preamble bits are used to establish bit synchronization and to locate the first bit in the packet.

Ethernet packets vary in length, but the minimum length is 64 bytes (of which 46 are data) and the maximum is 1,526 bytes (1,500 data). The minimum packet size allows the station controller to detect and discard packet fragments due to a collision; however, it also adds a degree of system inefficiency because some stations may have fewer than 46 data bytes to send. In such cases, the data field must be padded with zeroes. The maximum packet size helps ensure receiver buffer size compatibility among network stations.

In token-ring local-area networks, the size of the packet varies with the overhead required to establish the token and move it among stations and the amount of information allowed in the data field. The latter is influenced by the application.

For example, file transfers make good use of available bandwidth because long data blocks are sent. Interactive applications tend to be inefficient, however, because the amount of time a station can hold the token is limited.

Ethernet supports three station addressing schemes: network-specific, unique and multicast. Network-specific stations are assigned network addresses that are unique on their network but may be the same as a station address on another network.

Unique addressed stations have no similarly addressed counterparts on other networks. Unique addressing is particularly valuable in internetwork communications because it is not necessary to specify both a station and a network address to produce an unambiguous address at the next protocol level.

In addition to single station addressing, Ethernet supports multicast addressing, where packets may be targeted at more than one destination. This access method is particularly valuable in distributed applications. For example, users could group receiving stations into a multicast address called "sales" and send packets to all included stations by merely indicating sales in the address. Broadcast is a special case of multicast in which a packet is sent to all stations.

Another valuable addressing facility supported by some local net vendors is resource naming. In this scheme, users assign specific names to resources and call them by invoking the name rather than network address. Vendors supporting these facilities are also shown in the chart.

Transmission Control Protocol/Internet Protocol (TCP/IP) is employed to allow diverse hardware and software products to communicate with each other. Gateways allow communications with facilities outside the local network. The most common gateway is X.25, which permits communications over public packet networks. Other gateways allow the local-area network to interface with IBM hosts in System Network Architecture mode.

Servers are devices that allow users to share devices such as files and printers. A terminal server allows devices that normally would not be supported due to incompatible protocols to access the local network. A communications server allows terminals to connect to the network by dialing into the local network.

Many local net vendors rely on third-party sources for their operating system and server software. Among the principal systems software vendors are Bridge, Excelan, Corvus, Novell, Proteon and 3Com.

▶ PROTOCOL SOFTWARE

It's not what you say, but how you say it

Local-area networks are hampered by the incompatible protocols used by vendors to implement their products. Currently, the International Standards Organization is working with the seven-layer Open Systems Interconnect (OSI) model to define a framework for the communications process.

Layer 1, the physical link, is the electrical and mechanical interface, such as RS-232C. The second layer, data link, defines line, circuit or packet protocol, such as High Level Data Link Control and Synchronous Data Link Control. The network layer, Layer 3, is concerned with routing and, if applicable, packet management. Ethernet incorporates these three in its transmission media protocols.

The transport layer defines the end-to-end connection procedures, and the session layer is concerned with dialog and connection establishment. Systems Network Architecture sessions are examples here. Layer 6, the presentation level, defines syntax and is typically device-dependent. Finally, the application layer defines the rules for user services, such as file transfer and remote terminal inquiry. When fully implemented, this model will establish common ground rules for implementing service at each layer.

Unfortunately, the entire OSI model has not been standardized; therefore, selecting products that claim to be OSI-compatible might present some unpleasant surprises to users planning to implement different vendor products on their local-area net.

TCP/IP vs. XNS

The two most commonly used local-area network protocols are the Transmission Control Protocol/Internet Protocol (TCP/IP) and the Xerox Network System (XNS), both of which establish ground rules that allow different vendor products to communicate with each other. In addition, IBM's Network Basic I/O System (Netbios) and Advanced Program-to-Program Communications (APPC) present a common set of protocols to allow multivendor products to communicate on the token-ring local-area net.

TCP/IP was developed in the early 1970s by the Department of Defense Advanced Research Project Agency. The agency developed it as a means of testing protocol over its Advanced Research Projects Agency Network (Arpanet) packet-switched wide-area network. Arpanet is now known as the Defense Data Network (DDN).

COMMUNICATIONS
SOFTWARE

TCP/IP has been in the public domain for about a decade and is being used to connect diverse products. A number of commercially available products use TCP/IP.

The protocol entered the commercial local-area network market on the wings of the University of California at Berkeley's Unix 4.2 operating system. Unix 4.2 incorporates TCP/IP into its kernel, allowing Unix to implement high-level protocols.

Also incorporated is an address resolution protocol that maps TCP/IP addresses to Ethernet IEEE 802.3 addresses. This makes for a convenient interface.

The XNS protocol has publicly been available for about six years and is the de facto standard for local-area nets in office automation and product development applications.

Xerox Corp. designed XNS specifically for local-area networks running under Ethernet. XNS and TCP/IP are layered protocols. When running on an Ethernet network, XNS and TCP/IP correspond to Layer 1 of the OSI model and IEEE 802.3, .4 and .5 standards.

TCP/IP and XNS also offer compatible services at OSI Layers 2, 3 and 4. In Layer 3, both protocols provide internetwork communications facilities; while at Layer 4, they provide transmission control.

The two protocols start to differ at Layer 5. Here, XNS has its Courier function for session establishment, but TCP/IP has no corresponding facility.

XNS has not been defined at Layers 6 and 7. At Layer 6, TCP/IP has a Telenet File Transfer protocol that corresponds roughly to OSI Layers 6 and 7 and allows data transfer between dissimilar products or operating systems.

While XNS has not been fully standardized, Xerox has published some protocols for Layers 5, 6 and 7. The company also offers a raster encoding standard for bit graphics and a printer integration service for page formatting.

Unlike TCP/IP, XNS has no virtual terminal protocol. However, XNS is a more efficient protocol due to its data packet orientation. TCP/IP is byte-oriented and is also hampered by its mandatory "checksums," which slow overall transmission. Checksums are a summation of digits or bits made according to an arbitrary set of rules and are used to verify data.

Token-Ring talk

For its Token-Ring local-area network, IBM offers the Netbios interface, introduced for its PC Network local-area net, and an SNA version of its APPC facility.

Netbios sits conceptually between Layers 5 and 6 of the OSI model. It defines the method and format for interfacing to local-area net communications subsystems, and it details the specific calling sequences and control tables.

Netbios can easily be incorporated into third-party devices for use on IBM's Token-Ring local-area net, and it ensures their interoperability.

In addition, it allows software written for the PC Network local-area net to run on IBM's Token-Ring.

IBM has also made public APPC specifications, and the company identifies the network protocols established in the SNA node for Logical Unit 6.2 and Physical Unit 2.1 interaction.

LU 6.2 permits direct peer addressing. While Netbios extends to Layer 5 of the OSI model, APPC extends into Layer 7.

Given IBM's success with open systems, as evidenced by the company's personal computers, it's a safe bet that many products and software applications will emerge for the Token-Ring.

—John Hunter

NETWORK WORLD
THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES

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1 **My primary areas of activity.** Circle ONE only.
I am involved in evaluating communications (data, voice and /or image) products and services:
1. for *use within my own* company/organization
2. for *resale* to other companies/organizations
3. Both

1a **For communications, my primary responsibility is:** Circle ONE only.
1. Data Communications
2. Voice Communications
3. Both

2 **Circle only the ONE title classification which most applies to you.**

Company Management
11. Chairman, Pres., Owner, Gen. Mgr., Partner, Director, CIO, VP, Dir. Head of Finance, Admin. Procurement

Communications Management

Data Communications
21. Management
    VP, Dir., Mgr., Head, Chief: Data Communications, including Networks, Engineering, Design, R&D, Application Development
22. Supervisory/Staff
    Supervisor, Head : Networking, Design, Analysis, Engineering, R&D, Applications, Services

Telecommunications
31. Management
    VP, Dir., Mgr., Head, Chief: Telecomm., Voice Comm., including Networks, Engineering, Design, R&D, Application Development
32. Supervisory/Staff
    Supervisor, Head: Networks, Design, Analysis, Engineering, R&D, Applications Services

Factory Communications
41. Management
42. Supervisory/Staff

MIS/Data Processing
51. Management
    VP, Dir., Mgr., Head, Chief: MIS/DP, Systems Application Development, Operations, Office Automation
52. Supervisory/Staff: Supervisor, Head of System Design, Analysis, Applications

Others
75. Consultant
80. Educator
85. Financial Analyst
90. Marketing/Sales
95. Other ______________________

3 **Job Function**
Which one of the following best describes your functional involvement with communications (data, voice, and/or video) products? Circle ONE only.

Corporate
1. Business Management, Planning and/or Development

Communications System/Network
2. Management, Planning and/or Development
3. Implementation and/or Operation
4. Other ______________________

4 **Which one of the following best describes the primary business activity of your organization at this location?** Circle ONE only.

Consultants
11. DP/Communications Consulting Services
12. Consulting Services (except DP/Communications)

End Users
13. Manufacturer (other than computer/communications)
22. Finance/Banking/Insurance/Real Estate
23. Education
24. Medicine/Law
25. Wholesale/Retail Trade
26. Public Utility/Transportation
27. Mining/Construction/Petroleum Refining/Agriculture/Forestry
28. Business Services (excluding DP/Communications)
29. Government: Federal
30. Government: State/Local

Vendors
41. Carrier: including AT&T, BOCs, Independent Telcos, Public Data Networks, Intern'l Records Carriers
42. Interconnect
43. Manufacturer Computer/Communications Equipment
44. Value Added Reseller (VAR), Systems House, Systems Integrator
45. Distributor
46. DP/Communications Services (excluding consulting)
95. Other ______________________

5 **In which ways do you typically become involved in acquiring communications products (data, voice, and/or video) and services?** Circle ALL that apply.
1. Recommend/Specify
2. Identify/Evaluate Potential Vendors
3. Approve the Acquisition
4. None of the Above

6 **Check ALL that apply in columns A and B.**
A. I am personally involved in the acquisition process (specification, selection, approval) for the following products and services:
B. These products and services are presently in use at this location:

	A	B	*Product/Services*
			Computers
01.	☐	☐	Micros
02.	☐	☐	Minis
03.	☐	☐	Mainframes
			Data Communications
04.	☐	☐	Communications Processors
05.	☐	☐	Comm./Networks Software
06.	☐	☐	Digital Switching Equipment
07.	☐	☐	Facsimile
08.	☐	☐	Modems
09.	☐	☐	Multiplexers
10.	☐	☐	Protocol Converters
11.	☐	☐	Network Mgmt. & Control
12.	☐	☐	Test Equipment
13.	☐	☐	3270 Controllers
			Telecommunications
14.	☐	☐	PBXs
15.	☐	☐	Key Systems
16.	☐	☐	Central Office Equipment
17.	☐	☐	Integrated Voice/Data Terminals

	A	B	*Product/Services*
			Transmission/Network Services Equipment
18.	☐	☐	Microwave
19.	☐	☐	Satellite Earth Stations
20.	☐	☐	Local Area Networks
21.	☐	☐	Wide Area Networks
22.	☐	☐	Packet Switching Equipment
23.	☐	☐	Fiber Optic Equipment
			Communications Services
24.	☐	☐	Packet Switching Services
25.	☐	☐	Cellular Mobile Radio Services
26.	☐	☐	Electronic Mail
27.	☐	☐	Enhanced Services
28.	☐	☐	Centrex

7 **Estimated value of communications systems, equipment and services:**
A. which you helped specify, recommend or approve in *last* 12 months? Check only ONE in column A.
B. which you plan to specify, recommend or approve in *next* 12 months? Check only ONE in column B.

	A	B	
1.	☐	☐	Over 10 million
2.	☐	☐	$5-10 million
3.	☐	☐	$1-5 million
4.	☐	☐	$500,000-1 million
5.	☐	☐	$250,000-500,000
6.	☐	☐	$100,000-250,000
7.	☐	☐	$50,000-100,000
8.	☐	☐	Under 50,000
9.	☐	☐	Don't know

8 **Estimated gross annual revenues for your entire company/institution:**
Circle only ONE.
1. Over $1 billion
2. $100 million to $1 billion
3. $5 million to $100 million
4. Under $5 million

9 **Estimated number of total employees at this location:**
Circle only ONE.
1. Over 5,000
2. 1,000-4,999
3. 500-999
4. 250-499
5. 100-249
6. 50-99
7. 20-49
8. 1-19

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Finally, in determining the lowest cost per port for each product, the vendors were asked to quote a price to connect a single station to the local-area network and move a packet of information from one point to another. This figure includes the cost of hardware and software. Whether baseband is better than broadband is a matter of application. Frankly, users never could see any sense in Ethernet. Although it does theoretically permit applications to run at 10M bits, in practice this number is greatly reduced because of system overhead. That point, however, is just about moot. How many applications need 10M bits? How many stations or host processors can accept 10M bits?

Ethernet's free-for-all CSMA/CD accessing technique makes no sense. Packet collision causes processing operations to cease temporarily, which reduces throughput. CSMA/CA is a more intelligent scheme, and token passing is better yet. It looks like Big Blue knew what it was doing when it embraced the token ring. ☑

Benchmarks from **page 31**

work has its own mix of applications and its own periods of high activity. It's impossible to take results from a mixed-application test and apply them to office conditions.

The specific-operation test usually is based on the maximum number of times each operation can be executed in a given time period. If it's examining local net hardware performance, the test can measure maximum throughput for a specific local net/network server combination. In either case, the test is limited to a single variable, and the results can be extended to a user's own site environment.

A specific-operation test can examine throughput in each of the operations. These include private reads or writes to nonshared areas of disk, public reads or writes to shared areas of disk, sequential reads to contiguous areas of disk or random reads to scattered areas of disk. Implementation of local net architecture affects each of these operations, and a local net that does well on one test may perform poorly on the others.

Some early local net performance tests looked only at single-user applications and were based on the word processing/private read operation. Because most present-day local nets are expected to support multiuser information sharing, the failure to test the local net in a multiuser environment is a serious mistake.

If a user's office does only word processing on the network, the primary operation is executing private, often sequential reads. On the other hand, if inventory, accounting or some other data base-type work is the primary application, then the network must handle public reads to random areas of disk.

The best performance tests create a uniform hardware environment to test only the network operating system executing various operations. Then they establish a uniform operating system environment to test the hardware using various combinations of network adapters, cables and servers. Component benchmarks suggest ways to improve performance without a 100% replacement.

It is possible to test a complete system — one vendor's total solution against another's. This kind of test, however, lends itself to a useless apples-and-oranges comparison, such as one vendor's fastest network adapter and server against another vendor's slowest adapter and server.

For users evaluating local nets, published benchmarks can be an excellent resource. However, before users base any decision on those benchmarks, they should send for a full description of the tests involved. When results vary from one benchmark series to another, the test descriptions usually tell why. ☑

Users from **page 31**

automate a wholesaler's order system, for example. Voice messaging services are available that can be cheaper than buying an answering machine. Also, some Centrex services accommodate as few as three to five lines and might save a small business as much as 20% to 25% on its telephone bills. And for a business that has much customer contact over the telephone, the better quality of Centrex service can translate into more loyal customers, giving the business a competitive edge.

One factor working in the small-business man's favor is the changing attitude of telecom vendors. These vendors, including the local phone companies, are paying more attention to small businesses. Small companies that are more aggressive in their dealings with vendors should get more response because of this increased interest.

The survey differentiates small businesses along five industry categories: agriculture, construction, retail trade, wholesale trade and services (lodging, recreational, health, legal, educational and so on).

The results show that service

Continued on **page 42**

"As a consultant, I must make good recommendations to my clients on which products will enhance their networks. And, I want to be sure the vendors of these products have a future. Network World gives me a good sense of vendor viability."

Ron Orazine is a senior consultant involved in both data and telecommunications at Network Systems Design in Waltham, MA. He consults with large-scale communications users on the analysis and design of networks, as well as the design and selection of PBX systems. He is also the author of the firm's monthly client newsletter.

As a consultant to many leading communications users, Ron finds *Network World's* user-oriented editorial extremely helpful in his work. "In an industry that's churning as fast as telecommunications, it's hard to know what companies are going to survive," says Ron. "I must make good recommendations to my clients on which products will enhance their networks. And, I want to be sure the vendors of these products have a future. *Network World* gives me a good sense of vendor viability," he adds.

"*Network World* covers breakthroughs in the market, and the contracts section keeps me informed on how vendors are doing," Ron explains. "The articles are presented in a unique way, and the writing style is easy to comprehend." And, according to Ron, *Network World* gives readers all the news on the hottest topics. "I read every issue. Articles like 'AT&T Takes Aim at Centrex' give me an understanding of market strategies. And, there's been great coverage of networking, T-1s, leading edge installations, and office automation," he explains.

Network World is the first and only newsweekly written specifically for communications users. Over 60,000 purchase-involved subscribers, like Ron Orazine, look to *Network World* for the information that can help them—and their companies—stay ahead. If you market communications products and services, there's no better place to reach a powerful audience of communications buyers. Contact your local *Network World* sales representative and reserve space for your ad today.

NETWORK WORLD

The Weekly Reading for Leading Users of Communications Products & Services

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From **page 41**

firms have significantly more telephone lines, personal computers and specialized telecommunications services than the average. While 57% of service firms have four or more telephone lines, 57% of retail firms use two phone lines or less. Wholesalers tend to have greater long-distance telephone bills, and their use of telex (15%) is more than twice the average of 7%. Construction firms are big users of answering machines at 38%, compared with the average (22%).

These findings show that small businesses are more advanced in their communications and automation habits than was previously thought. However, further advances into state-of-the-art communications solutions have been hampered by a heterogenous small-business market and the lack of user knowledge of communications alternatives.

> *“Wholesalers’ use of telex (15%) is more than twice the average of 7%.”*

Deregulation from **page 1**

tion Services, Inc., and first vice-president of the Communications Managers Association.

“Even in a regulated environment, rates have risen significantly. If the local phone companies start going into other businesses, they will be trying to raise money anywhere to subsidize those businesses,” Gaffney added.

Tom Taylor, communications manager at Jacksonville, Fla.-based Independent Life, believes otherwise. He thinks local deregulation would be beneficial in areas with lively local competition. “There are a number of mom-and-pop local companies out there,” he said. “Deregulation just means I might have to deal with a few more.”

Jeff Lipton, communications manager at the University of Colorado in Boulder, noted that Fowler’s proposal is not unlike some existing state policies, such as the recently announced effort to deregulate local communications in the state of Nebraska entirely.

In addition, Lipton said local deregulation might be helpful to business because companies would no longer have to subsidize the cost of residential services. Increased competition may also help some local companies provide central office solutions that are competitively priced or less expensive than premises-based solutions, he added.

“However,” Lipton said, “there are some market segments without competition. A local operating company could ream a customer for some services such as private lines because there is no place else to buy them.

“It would take years for the customer to build a bypass network, if building a bypass network were to become the alternative,” he added. “In the meantime, local operating companies could raise rates for services.”

Although Lipton said he would personally like to see total deregulation, he said he believes the provision of local residential service will always be a regulated entity.

> *“There are some market segments without competition. A local operating company could ream a customer for some services such as private lines.”*

“I cannot see any state willing to permit local telephone companies to charge $50 per line for residential service,” he said.

Dwight Faulkner, communications manager at the Summit, N.J., regional office of Ciba-Geigy Corp., a large pharmaceutical company, said local deregulation is likely to stir up more confusion and create difficulty in the management of remote telecommunications systems.

“We already went through three or four years of confusion,” he said, “and now it’s getting muddy again because AT&T Communications and AT&T Information Systems are getting back together. The government forgets that they keep throwing things at us and we have to keep reacting. It would be nice to see a little industry stability.”

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NETWORK WORLD

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▶ MESSAGE HANDLING

Novell reveals plan to link Netware

Firm reaches out to IBM, DEC network environments.

BY MARY PETROSKY
West Coast Correspondent

SANTA CLARA, Calif. — Novell, Inc. reported last week that it is developing a message handling service that will make it easier to route messages between its Netware operating system and other message and network environments, including IBM and Digital Equipment Corp. systems.

In addition, Novell announced that it will market The Coordinator, an application developed by Action Technologies, Inc., of Emeryville, Calif. The Coordinator integrates electronic mail, calendaring, word processing and message management so users can keep mail "conversations" on file and sort them by individual, project or work group.

> *"Users can keep mail 'conversations' on file and sort them."*

Novell is using a kernel of software code from The Coordinator as the basis for Netware MHS, according to Chauncey Bell, president of Action Technologies. MHS is being designed to handle the mechanics of communications, such as initializing a modem, dialing and performing error correction.

As a result, MHS will allow software developers to more easily include communications as a function in their applications, according to Craig Burton, vice-president of corporate marketing and development. Applications developers will need to provide MHS with basic information such as the recipient's name and address.

The first release of MHS will

See **Novell** page 44

DDS from **page 1**

tributable to the local channel portion of the circuit, according to figures compiled by Dave Glowacz, senior analyst in the Tariff and Industry Analysis Group at CCMI/McGraw Hill, Inc. in Ramsey, N.J., a tariff analysis company.

Glowacz compared rates for a voice-grade private line, a 9.6K bit/sec DDS facility and a 56K bit/sec DDS link at three times: the quarter preceding the tariff change, the day the tariffs took effect and currently. Prices for each line type were calculated using a circuit between Newark, N.J., and Hartford, Conn., as an example of interstate rates, and a line between Newark and Camden, N.J., to show intrastate rate changes.

Interstate DDS rates at 9.6K and 56K bit/sec fell by almost half between the fourth quarter of 1984 and the date Tariffs 9 and 11 went into effect last year. Since then, end-to-end rates for 9.6K bit/sec DDS circuits rebounded almost 50%, and the 56K circuit rates rose by about a third. Most of the increase appears in the local channel as opposed to the interoffice connection.

"As far as AT&T is concerned, the only two changes came when we implemented the new tariffs and later when a 3.3% increase took effect on the interoffice channel that AT&T provides between AT&T offices," according to AT&T spokesman Jim Byrnes. The local access channels provided by the local telephone companies have changed several times, depending on the territory, Byrnes said.

With the interoffice channel of AT&T's new tariffs, the price difference between 2,400 and 9.6K bit/sec DDS services was significantly reduced, according to Page Montgomery, vice-president of Economics and Technology, Inc., a Boston, Mass.-based consulting firm.

Rates compiled by AT&T for a circuit from New York to Chicago are the same for 2,400 and 4.8K bit/sec service, reflecting an increase in the lower speed circuit and a slight decrease for the higher speed link. The AT&T example presumes a zero-mileage local channel band. For higher speed services, the rate for a 9.6K bit/sec link serving the same sample route is slightly higher than the lower speed services, and the rate for 56K bit/sec service is roughly three times as much as that 9.6K bit/sec circuit.

AT&T DDS rates vs. private lines

Intrastate (74 mi.) Newark N.J. to Camden N.J.

		4Q '84	AT&T Tariff 9&11	Current
Voice grade private lines	LC	$ 55.88	$ 96.06	$ 96.06
	IOC	253.84	263.13	210.70
	Total	309.72	359.19	306.76
DDS 9.6K (Type 2)	LC	559.84	559.84	559.84
	IOC	92.99	92.99	92.99
	Total	652.83	652.83	652.93
DDS 56K	LC	679.54	679.54	679.54
	IOC	304.40	304.40	304.40
	Total	983.94	983.94	983.94

LC = Local Channel
IOC = Interoffice Channel

Interstate (106 mi.) Newark, N.J. to Hartford, Conn.

		4Q '84	AT&T Tariff 9&11	Current
Voice grade private lines	LC	$ 151.40	$ 224.26	$ 273.84
	IOC	258.56	218.85	226.47
	Total	409.96	443.11	500.31
DDS 9.6K (Type 1)	LC	766.00	298.01	527.64
	IOC	258.56	238.85	248.71
	Total	1,024.56	536.86	276.35
DDS 56K	LC	1,816.00	416.68	861.11
	IOC	1,283.40	1,002.10	1,037.31
	Total	3,099.40	1,418.78	1,898.42

Included: Access coordination function, C.O. connection changes, 5-mile local channels at each end.

CCMI/McGraw in Ramsey, N.J., analyzed the price difference between AT&T voice grade private lines and Dataphone Digital Service by pricing out an intrastate and interstate circuit at three points in time — pre-implementation of AT&T's Tariffs 9 and 11, at implementation and current rates.

The future of DDS rates is unclear. DDS itself is 1970s technology, according to John McQuillan, a consultant in Cambridge, Mass. In two to three years, a new generation of digital service may bring the price of digital service below analog service, he said. Competition may also encourage rate reduction. McQuillan said he expects US Sprint Communications Corp. to bring out a digital service within the next two years.

Pricing aside, the benefits of digital transmission systems for data support are encouraging a migration to DDS-like services. "The trend is away from analog for sure," Montgomery said. But the analog base has remained much steadier than was predicted five years ago, he added, because digital facilities haven't been "turned up" as quickly as users would have liked.

Of the one million private lines in the country today, 90% are analog, explained Montgomery, who said that percentage has remained constant for the last three or four years. He predicted the figure would drop to 85% or 80% next year.

The customer base for analog private lines is much larger than it is for DDS, agreed AT&T's Byrnes. But the user trend, he said, is toward digital.

Jim Reinhard, AT&T DDS product marketing manager, said a number of customers continue to use analog private lines and are generally satisfied with the level of performance that they get with today's modem technology. "But for critical business applications that demand very high levels of reliability and accuracy, DDS is the preferred data transfer alternative," he declared.

Reinhard characterized the growth of DDS, first made available in interstate tariffs in 1974, as healthy. Geographically, "DDS is not as ubiquitous as analog services," he said. It is offered in just over 100 of AT&T's 164 local access and transport areas. The company is working to expand DDS' availability, Reinhard said.

The cost difference between analog and digital service for AT&T rates at 9.6K bit/sec is "a wash," according to Gerald Mayfield, president of The DMW Group, Inc., a consulting company in Stamford, Conn. Analog lines are cheaper than digital, he said. But analog lines require conditioning to ensure that 9.6K bit/sec capability, Mayfield continued. With the conditioning cost factored in, analog rates approach digital rates at that speed, he said.

But conditioning is not necessary for multipoint lines, according to one user, who requested anonymity. He said his company conditions only point-to-point lines. "Modem technology takes care of things for us," he said.

Modems have become more sophisticated since AT&T introduced DDS and today offer control and management features that are often more important to users than circuit prices, according to Montgomery. When AT&T introduced the service, the company claimed that many would move to DDS to avoid modems, he said.

DDS users say they employ digital service selectively. The First National Bank of Chicago uses DDS at 9.6K bit/sec in selected high-volume applications where high reliability is crucial, according to systems officer Edward Reynolds. "There's a price/performance tradeoff," he said. "We probably lean a little more towards performance rather than cost in those scenarios where we've gone to DDS. We are primarily analog. For most of our applications, analog is fine."

Revlon, Inc. is switching from analog to 56K bit/sec digital service at two sites in New Jersey and Long Island, N.Y., according to Henry Davis, manager of data communications at the company. After performing a cost and data traffic analysis, Davis concluded that digital service at those locations would increase transmission speed, improve reliability and provide "conservative" cost savings as well as room for growth.

Novell from **page 43**

support asynchronous communications, with future releases offering support of X.25, Systems Network Architecture and High Level Data Link Control protocols, Burton said. Although the only application MHS currently supports is The Coordinator, Novell plans to provide connections to X.400-based electronic mail networks, IBM's Professional Office System (Profs) and Digital Equipment Corp.'s All-in-One, Burton added.

A number of vendors are addressing the need to provide message handling across networks, according to Eric Arnum, data communications analyst with International Resource Development, Inc., a market research firm based in Norwalk, Conn. "Local-area network users realize that the eight or ten people they can talk to on their immediate network are hardly the whole universe," Arnum said.

Although some vendors are providing gateways to SNA, X.25 and other networks, messaging products to date have been local network-specific, such as 3Com Corp.'s 3Plus Mail, which works with 3Com hardware. 3Com will shortly begin shipping a new version of its network operating system that will allow 3Plus Mail to operate over IBM's Token-Ring Network. Novell's MHS could be a "watershed" product in the messaging arena because Netware runs on a range of net hardware and has a strong market presence, Arnum said.

> *"Local-area network users realize that the eight or ten people they can talk to on their immediate network are hardly the whole universe."*

He questions, however, the wisdom of Novell developing hooks from MHS into IBM's Profs and All-in-One when the connections to these systems could be made through X.400, a growing standard. He said he feels that, "What the market needs is a company like Novell to hook its 300,000 or so users into the [Open Systems Interconnect] model with an industry standard such as X.400."

Novell currently has plans to link directly to IBM and DEC systems, allowing local-area network users to bring Profs messages down to their personal computer and vice-versa, according to Roger White, a senior writer in communications at Novell.

Novell expects to have documentation for MHS available some time in the fourth quarter of this year. Netware-specific versions of The Coordinator will be available Oct. 27. The network version of The Coordinator, which resides on a server, is priced at $2,495 and comes with a license for up to 50 users. Because the application entails tracking messages over time, Novell recommends that 2 megabytes of storage per user be allocated on the server. A $1,995 License Expansion enables each system to expand from 50 to 100 users per local-area network.

A third component, the $995 Telecommunications Manager, allows for asynchronous communications via modem between local-area networks and between a local net and remote stand-alone personal computers. The stand-alone version of The Coordinator, is priced at $495. ◘

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Readyline from **page 2**

would enable Wats calls to be placed using switched-access lines instead of lines dedicated to Wats service. CSNS is targeted at users with between 25 and 1,000 hours of Wats calling per month.

Both filings, analysts feel, are due to pressure from increases in what AT&T must pay to local carriers for special access lines and the drop in cost for switched access lines. "I tend to see this as simply the same solution applied to 800 customers as they are applying to Wats customers," Harder said.

An industry plan, referred to as Unity 1-A, calls for the reduction of the special-service access line charges to zero by 1988, according to Robert Ellis, president of the Rockville, Md.-based Aries Group. If that plan is adopted, it would make putting Wats and 800 services on switched lines more financially appealing to AT&T. "AT&T wants to get a product in place that will preserve its existing business with the minimum of regulatory headache," Ellis said.

Don Lerch, an AT&T services development staff manager, said the same Common Channel Signaling architecture used to provide AT&T's other 800 Services will be used to provide the new offering. ◘

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Oct. 23, St. Louis, Mo. — AI in the Real World: Applications in Artificial Intelligence. Contact: Kathryn Atnip, Center for the Study of Data Processing, Washington University, Campus Box 1142, St. Louis, Mo. 63130.

Oct. 26-27, Anaheim, Calif. — Teleconferencing: Steps to Take, Moves to Make. Contact: National University Teleconference Network, 332 Student Union, Oklahoma State University Campus, Stillwater, Okla. 74078.

Oct. 27-28, Anaheim, Calif. — Local Area Networks. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015.

Oct. 27-28, Bethesda, Md. — The Post-Divestiture Tariffs and Their Impact on Large Networks. Contact: Janet Hunter, The Aries Group, Inc., Suite 320, 1500 Research Blvd., Rockville, Md. 20850

Oct. 27-29, Paris — The First Annual Interface International in Europe Conference and Exposition. Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Oct. 27-31, San Francisco — SNA: Architecture, Products and Current Implementations. Also, Dec. 1-5, New York. Contact: Information Breakthroughs, Inc., 445 W. Main St., Wyckoff, N.J. 07481.

Oct. 28-29, Washington, D.C. — The Fowler Challenge: Deregulation and Competition in the Local Telecommunications Market. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

Oct. 29-31, Colorado Springs — An Intensive Introduction to Integrated Data/Telecommunications. Also, Nov. 12-14, Washington, D.C.; Nov. 17-19, Boston; Dec. 8-10, Detroit; Jan. 7-9, Dallas. Contact: The American Institute, Inc., Carnegie Bldg., 55 Main St., Madison, N.J. 07940.

Oct. 30-Nov. 1, Miami — The Ninth South Florida Computer & Business Equipment Showcase. Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Nov. 2-6, Dallas — Fall Joint Computer Conference. Contact: The Fall Joint Computer Conference '86, 1950 Stemmons Freeway, Dallas, Texas 75201.

Nov. 3-6, Washington, D.C. — Modern Data Communications. Contact: Continuing Engineering Education Program, George Washington University, Washington, D.C. 20052.

Nov. 3-7, Boston — Omnicom Week. Also, Dec. 15-19, Denver. Contact: The Omnicom Institute, Suite 304, 501 Church St., N.E., Vienna, Va. 22180.

Nov. 4-7, St. Louis, Mo. — The North American Telecommunications Association's 1986 Convention and Exhibition Showcase. Contact: North American Telecommunications Association, 2000 M St., N.W., Washington, D.C. 20036.

Nov. 5-7, New York — PC Data Communications and Networking for the Non-Data Communications Professional. Also, Nov. 17-19, Boston. Contact: Data-Tech Institute, Lakeview Plaza, P.O. Box 2429, Clifton, N.J. 07015.

Nov. 10-14, Las Vegas — The Eighth Annual Comdex/Fall. Contact: The Interface Group, Inc., 300 First Ave., Needham, Mass. 02194.

Nov. 12-13, New York — Sixth Annual Telecommunications World Update. Contact: Judy Maurer, The DMW Group, Inc., 2020 Hogback Road, Ann Arbor, Mich. 48104.

Nov. 13-14, New York — Communications Law. Contact: Practicing Law Institute, 810 Seventh Ave., New York, N.Y. 10019.

Nov. 13-14, Washington, D.C. — Satellite Technology for the Non-Technical Manager. Contact: Phillips Publishing, Inc., 7811 Montrose Road, Potomac, Md. 20854.

Nov. 17, New York — Data Broadcasting Technology. Contact: Waters Information Services, Inc., P.O. Box 2248, Binghamton, N.Y. 13902.

Nov. 17-20, Boston — Experts on Networks. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

Nov. 19-20, Boston — Educational Seminar on T-1 Facilities and Networking. Contact: Timeplex Seminars, Timeplex, Inc., 400 Chestnut Ridge Road, Woodcliff Lake, N.J. 07675.

Nov. 19-21, San Francisco — Bypass Networking with Small Satellite Terminals. Contact: Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402.

Nov. 19-23, San Diego — Society of Telecommunications Consultants' Fall Conference. Contact: Ms. Effie Cooper, Society of Telecommunications Consultants, Suite 1410, One Rockefeller Plaza, New York, N.Y. 10020.

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▶ PRODUCT REVIEW

Emulation to communications, protocol converters mature

Digital Communications Associates, AST Research dominate the market.

BY JOHN J. HUNTER
Contributing Writer

You've come a long way, baby. No, this isn't a cigarette commercial. It's a review of three units that have moved protocol converters from the realm of devices that simply emulate terminals to units that provide self-contained communications facilities.

There are many protocol converters on the market today, but the most popular application allows asynchronous terminals and printers to operate in IBM 3270 environments by emulating 3277, 3278 and 3279 terminals and 3287 printers.

Such protocol converters generally consist of stand-alone "boxes" with an RS-232C plug at one end for connecting the Ascii terminal/printer and a coaxial connector at the other end for attachment to an IBM 3274/3276 cluster controller. The protocol converter handles the chore of converting Ascii code into its own 3270 code and vice versa.

In addition, the protocol converter does the keyboard and screen mapping required to allow the low-cost Ascii terminals to emulate the more expensive IBM workstations. Such protocol converters, however, are designed for installations where IBM 3274/3276 controllers already exist. And because they have no communications facilities of their own, those converters must rely on the 3270.

Although protocol converters like those continue to sell because many applications don't require a stand-alone 3274 emulation, their popularity has diminished with the increased use of personal computers at all levels of business.

Instead of using personal computers for local processing only, many companies want those machines to function in both local and remote applications in a 3270 environment.

These same applications also demand more than simple terminal protocol conversion; they must also emulate the 3270 controller, have self-contained communications facilities and provide first-rate file transfer services.

Two companies that dominate the protocol converter market are AST Research, Inc. of Irvine, Calif., and Digital Communications Associates (DCA), a Norcross, Ga., firm known for its Irma product line, data switches and multiplexers. Both of these companies offer a wide variety of protocol converters, the simplest being the aforementioned terminal emulators.

The more complex protocol converters permit personal computers to be used as cluster controllers (such as AST SNA/BSC clusters) or units that allow personal computers to be configured in a local-area network environment (such as DCA's Irmalan and AST's LAN adapter).

Although the latter two product categories are certainly notable, many applications involve only a few remotely located terminals and, therefore, need simpler emulators.

For that reason, three products — DCA's Irmacom and AST's BSC and SNA — will be targeted because they are designed to establish an IBM 3270-like capability and permit users to interact with IBM 370X front-end communications controllers.

Functionally, the AST and DCA products are similar in that they emulate an IBM 3270 cluster controller and permit the personal computer to emulate an IBM 3277, 3278 or 3279 workstation. All products also permit low-cost Ascii printers to be used in lieu of the IBM 3287. In addition, Irmacom emulates the IBM 3289 printer.

The AST and Irmacom products connect with IBM 370X front-end communications processors running with IBM's CICS/VS, IMS, TSO, Conversational Monitor System (CMS), Job Entry Subsystems 2 and 3, Vtam, Interactive Computing and Control Facility and Telecommunications Access Method software.

The AST products emulate the remote versions of the IBM 3274 cluster controllers and the 3276. Both AST units have a built-in modem eliminator that permits the product to be attached via an RS-232C connection to a local IBM 370X front-end communications processor at distances up to 50 feet. The 50-foot limitation seems a bit short, however, especially because a modem eliminator is involved. Irmacom also emulates the remote 3274/3276 but adds remote 3271 and 3275 emulation facilities.

The AST and DCA products support multiple logical sessions. Irmacom handles five such sessions that can consist of five 327X displays or a combination of displays and printers.

No more than two printer emulations can be handled, however. Both AST products support three sessions, but only one can be a terminal and two can be printers.

Both DCA and AST products use printed circuit cards that fit into a full expansion slot on an IBM Personal Computer XT or Personal Computer AT running DOS 2.0 and higher. Emulation is carried out by software residing on disk or diskette. The AST and Irmacom units can be field-upgraded from BSC to SNA/Synchronous Data Link Control (SDLC) or vice versa by simply changing the software.

Comparison of protocol converters from AST and DCA

	Vendor/Product		
	AST Research, Inc. SNA	AST Research, Inc BSC	Digital Communications Associates Irmacom
Emulation 3274/3276	✓	✓	✓
3277, 3278, 3279	✓	✓	✓
3287	✓	✓	✓
3289			✓
No logical sessions	3	3	5
TSO/CMS editor bypass			✓
Built-in modem eliminator	✓	✓	
Price	$895	$695	$895

SOURCE: TMS CORP., DEVON, PA.

Both BSC and SNA/SDLC modes of operation use the same printed circuit card. AST SNA hardware consists of 192K bytes random-access memory (RAM), one floppy or hard disk and one PC-compatible serial or parallel printer port. The BSC version has the same requirements but needs only 128K bytes RAM.

Irmacom requires 256K bytes RAM for its basic emulation facilities plus at least 320K bytes for its FT/TSO or FT/CMS file transfer programs. Both programs produce some dramatic decreases in file transfer times over conventional IBM TSO and CMS file-transfer methods. TSO and CMS reside at the host end and monitor the transfer of data from the personal computer.

As part of its operation, the CMS and TSO use an editor that verifies each line of data transmitted and sends a response to the personal computer. This verification causes the personal computer to wait between lines, thus slowing the entire data transfer process. For large file transfers, verification not only slows the entire operation, but it also runs up telephone line charges if the direct-dial network is used as the transport medium. Although transfer times under TSO and CMS will vary with the data transfer rates and the host processor load, some users say that 200 char./sec is typical.

DCA circumvents the TSO/CMS editor bottleneck with the FT/TSO and FT/CMS file-transfer programs. Both programs use code that resides in the host mainframe and bypasses the TSO and CMS editors. Therefore, the time-wasting verification process is eliminated. The FT/TSO and FT/CMS software, according to DCA, is also more efficient than its IBM counterpart. The net result is that between 700 and 2,500 char./sec can be transferred between the personal computer and host over a 4.8K bit/sec line.

The AST products' optional file-transfer software does not bypass the TSO or CMS editors but uses a proprietary scheme that significantly improves the data transfer rate over native mode operation. According to AST, between 240 and 350 char./sec can be transferred.

That's not bad considering that conventional TSO/CMS facilities are used. If file transfer software is not used, there are always conventional TSO/CMS transmission techniques. Still, for larger files, the Irmacom looks attractive, especially because DCA includes the host-resident software as part of the basic package.

Pricing information

The AST SNA plug-in circuit card, emulation software and modem eliminator list for $895. AST's BSC, which includes the product and the emulation software, costs $695. An upgrade of SNA or BSC involves purchasing emulation software, which costs $495 for each product. For file transfer software, add another $150 to the price of each product.

Irmacom also sells for $895 and includes the hardware and software emulation for the personal computer plus the software at the host site.

To move from SNA to BSC or vice versa, the software costs $595. Because DCA does not include a modem eliminator, add at least $100 to $200 for that product. ◻

Hunter is president of TMS Corp. in Devon, Pa.

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